SERIES 3, Vol. 14, No. 11 NOVEMBER, 1931

AMERICAN JOURNAL OF OPHTHALMOLOGY

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Subscription twelve dollars yearly. Single number, one dollar twenty-five cents.

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

BUSINESS OFFICE: 508 METROPOLITAN BUILDING, SAINT LOUIS, MISSOURI

EDITORIAL OFFICE: 524 METROPOLITAN BUILDING, SAINT LOUIS, MISSOURI

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AMERICAN JOURNAL OF OPHTHALMOLOGY
Volume 14 November, 1931 Number 11

CONCERNING CYCLODIALYSIS IN SIMPLE GLAUCOMA

HARRY S. GRADLE, M.D., F.A.C.S.
CHICAGO

Twenty-seven cases which exhibited the stated indications for cyclodialysis as the operation of choice and which had been under observation and treatment before and after operation for sufficient time for evaluation of results, are tabulated and discussed. Read before the American Ophthalmological Society, June 17, 1931.

The operation of cyclodialysis, introduced by Heine in 1906, has never received the serious consideration in this country that it warrants. The reason for this is not difficult to understand and is based upon two factors. In the first place, cyclodialysis is not an operation that is universally applicable to all forms of glaucoma nor even to all stages of simple glaucoma and before employing the operation, certain definite indications and contra-indications must be understood. These vary but little from the original indications as laid down by Heine in his first article and for the various pros and cons, the reader is referred to the rather voluminous literature, a complete compilation of which is to be found in Graefe-Saemisch, II Edition, Glaukom by Schmidt-Rimpler, p. 212, 1908, and Graefe-Saemisch, III Edition, Glaukom by Peters, p. 322, 1930. In the second place, cyclodialysis must not be considered a cure for glaucoma in the sense of an iridectomy or a trephine, but rather as an adjunct to the miotic control. Therefore, it cannot be used indiscriminately upon patients that cannot be kept under observation.

Consequently, it would seem of some import to consider the late effects of cyclodialysis upon selected cases that have been observed over a longer period of time. By "selected" is meant cases of simple non-inflammatory glaucoma that have never shown any inflammatory exacerbations, and which have been observed under miotic treatments for at least one month or more, and in which the intra-ocular tension, the vision, and the visual fields fail slowly despite miotics, and which have been watched for at least one year after operation. Twenty-seven eyes fulfilled these qualifications. Many times that number were rejected for this series because of inflammatory symptoms, of previous operation of some other type, because of insufficient observation under miotics before operation, or because of insufficient length of time of observation after operation.

The indications for cyclodialysis are definite and confined to the following types:

(a) Simple non-inflammatory glaucoma. The operation has small chance of success in the inflammatory type, either acute or chronic, and an inflammatory exacerbation of simple glaucoma lessens markedly the chances of success.

(b) That type of simple glaucoma that lies just beyond control by miotics. In the earlier stages of simple glaucoma and in some of the less severe cases miotics just fail to keep intra-ocular tension within the normal range, fail to prevent a gradual loss of vision, and fail to prevent a gradual increase in the visual field defects. Only continued observation and close control under miotics can determine such losses.

(c) Simple glaucoma with a high intra-ocular tension and a visual field defect that extends to within ten degrees or less of the center of fixation. In this type, cyclodialysis does not yield a permanent result, but is to be considered rather in the nature of a prelimi-

THE FOLLOWING TWENTY-SEVEN CASES WERE BASED UPON INDICATIONS A AND B (SEE TEXT).

Case	Age	Eye	Vision before operation	Maximum T before operation	Duration of medication before operation	Vision after operation	Maximum T after operation	Relative size of V. field after operation	Length of observation after operation
1	64	R	0.1	71	1 mo.	0	66	0	3 yrs.
2	63	L	0.5	48	1 yr.	0.5	29	no change	4 yrs.
3	46	L	1.2	36	5 mos.	1.2	18	no change	1½ yrs.
4	50	R	0.6	40	3 mos.	0.6	17	no change	1 yr.
5	60	L	0.1?	41	3 yrs.	0.1?	*	**	7 yrs.
6	45	R	1.0	55	2 yrs.	0.1?†	28	**	6 yrs.
7	65	R	6/200	57	1 yr.	5/200	20	decrease	6 yrs.
8	65	L	4/200	62	1 yr.	5/200	40	decrease	6 yrs.
9	33	R	1.2	54	1 mo.	0.8	28	no change	3 yrs.
10	33	L	0.6	61	1 mo.	0.8	30	no change	3 yrs.
11	58	L	0.2	52	4 mos.	0.1?†	20	decrease	4 yrs.
12	70	L	0.1?	30	1 mo.	0.4	25	no change	3 yrs.
13	45	R	0.1?	66	3 mos.	0.1?	17	no change	3 yrs.
14	60	L	0.5	48	3 yrs.	0.6	33	no change	5 yrs.
15	48	L	0.2	69	2 mos.	0.1?	60	0	4 yrs.
16	14	L	1.2	61	2 mos.	1.2	45	no change	4 yrs.
17	59	L	1.0	38	2 mos	1.0	26	no change	2 yrs.
18	45	L	0.6?	60	3 yrs.	0.6	40	no change	6 yrs.
19	52	R	0.6?	61	4 mos.	0.8	42	no change	5 yrs.
20	52	L	0.2	79	6 mos.	0.1?	20	no change	5 yrs.
21	35	L	1.0	51	1 yr.	1.2	*	no change	2 yrs.
22	40	R	0.8	53	4 mos.	1.2	42	decrease	4 yrs.
23	40	L	0.8	46	4 mos.	1.2	46	no change	4 yrs.
24	54	R	0.5	58	11 mos.	0.5	48	decrease	3 yrs.
25	50	R	0.8?	52	1 mo.	0.1?†	25	no change	4 yrs.
26	62	L	0	56	4 mos.	0	30	0	3 yrs.
27	57	L	L.P.	66	1 mo.	L.P.	*	no change	1 yr.
Av.	61								

* Tension normal on finger palpation.
** Fields not obtainable.
† Cataract.
no change. Indicates no essential change.
decrease. Indicates slight decrease in visual field.

nary operation to try to prevent the advance of the field defect over the center of fixation as so frequently happens after any iris cutting operation.

(d) Following a technically perfect iridectomy that has failed to control increased intra-ocular tension, cyclodialysis has proven to be of great value if performed immediately above the site of the iridectomy and after not too great a lapse of time.

Although this is too small a number to evaluate percentual results, still consideration of the cases should include percentages.

A. Failures. Two cases (7.4 percent), were absolute failures, no. 1 and no. 15. In neither of the cases were the absolute indications adhered to as strictly as should have been for both of them were cases that lay well beyond the control of miotics.

B. Partial success. Four cases (14.8 percent), fell into this class, no. 7, no. 8, no. 22, and no. 24. In no. 7, although the tension remained normal, there was a gradual decrease in the size of the visual field, the vision remaining unchanged. No explanation was apparent. In no. 8, no. 22, and no. 24, the tension remained above the upper limits of so-called normal, and there was a slight decrease in the size of the visual fields, although no change occurred in the visual acuity. In these three cases, further operative interference was performed.

C. Successful. In this class were 21 cases (77.8 percent). In the majority of these, the tension remained within the limits of reason, the visual acuity remained unchanged, and there was little or no decrease in the size of the visual fields. Whatever minor changes occurred did not interfere with the integrity of the eye as a visual organ except for extraneous circumstances, as in D (see below). It must be noticed in several cases that the intra-ocular tension was recorded as above that commonly accepted as normal. This point I have discussed at length in previous communications, but here it might be well to repeat that many postoperative cases of glaucoma develop what seems to be an immunity toward low degrees of what to a normal eye is hypertension. One striking case is that of a man

with simple glaucoma upon whose left eye cyclodialysis was performed in 1909, 1911 and 1913. For the last twenty-two years, the tension in that eye has never been below 33 mm. Hg and frequently is as high as 39 mm. Hg. Still the visual acuity has remained normal and there has been absolutely no decrease in visual fields or any paracentral scotoma formation. In this series of successful cases, there were five post-operative cases in which the intra-ocular tension remained above 30 mm. Hg. for years and five cases where the tension was between 25 mm. Hg. and 30 mm. Hg. All of these cases were observed for a minimum period of two years and none showed any malignant influence of this so-called hypertension.

D. Cataract formation. In three cases (11.1 percent), cataract developed slowly after operation to such a degree as to influence vision materially. I believe that this percentage is too low and with a larger series of cases, there will be a higher percentage of lens opacities. Many of the opacities are due to the mild uveitis that frequently follows a cyclodialysis, but many more are probably due to the trophic disturbance that follows the forcible severance of the ciliary nerves and possibly to the interference with function of the anterior surface of the iris. This is in line with the experimental cataract formation in rabbits that followed ultra-red raying of the anterior surface of the iris alone. However, it is not probable that there is any greater danger of cataract formation after cyclodialysis than after any of the iris cutting operations.

E. Increase in vision. There was an actual increase in vision of 10 percent or more in six cases (22.2 percent). I believe this percentage to be too high. Such increase in vision as occurred cannot be accounted for except on theoretical grounds which are none too sound.

Thus the percentage analysis reduced to a table is as follows:

	Percent
Failure—2 cases	7.4.
Partial success—4 cases	14.8
Success—21 cases	77.8
Cataract formation—3 cases	11.1
Increase in vision—6 cases	22.2

Conclusions

1. Cyclodialysis offers practically 80 percent chance of success, provided the indications for the operation are adhered to.

2. The indications for cyclodialysis in simple glaucoma are:

(a) Pure simple glaucoma without inflammatory reaction.

(b) That type of case in which continued use of miotics just fail to maintain the integrity of the visual fields, the visual acuity, and the balance of intra-ocular tension.

(c) The malignant simple glaucoma in which the peripheral defect of the visual field reaches to within ten degrees of the point of fixation.

3. Cataract formation occurs in slightly more than 10 percent of the cases after cyclodialysis.

4. Where proper indications exist, cyclodialysis is to be preferred to iridectomy or fistulizing operations because of:

(a) Less damage to the integrity of the eye as a visual organ.

(b) Less danger of immediate post-operative complications.

(c) No danger of late infection.

(d) Possibilities of repetition if unsuccessful.

23 East Washington street.

BACTERIAL FLORA IN EGYPTIAN TRACHOMA

PHILLIPS THYGESON, M.D., D.OPH.
DENVER

A report is given of the study of sixteen cases of Egyptian trachoma in infants and children in an attempt to isolate bacterium granulosis from them. In five cases a small morphologically similar Gram-negative rod was recovered but cultural characteristics were not identical. From the departments of Ophthalmology and Bacteriology, University of Colorado School of Medicine.

Egyptian trachoma has been studied extensively in the past by various investigators, among them Koch, Kartulis, Muller, Morax, Lakah and Khouri, Meyerhof.[1] A number of different microörganisms have been recovered from the disease, the more important of these being the diplobacillus of Morax, B. Koch-Weeks, the gonococcus, and the pneumococcus. All have been shown to be merely secondary invaders and not the etiologic agent in the disease.

Through the kindness of Dr. F. I. Proctor of Santa Fe, New Mexico, whose interest in the trachoma problem has been unfailing, I was enabled to spend two months in intensive bacteriologic study of trachoma at the Giza Memorial Ophthalmic Laboratory near Cairo. I am much indebted to Dr. Shahin Pasha, the Under-Secretary of State, Department of Public Health, and to Dr. Rowland P. Wilson, Director of the Laboratory, who so kindly extended the facilities of the institution to me. I am also indebted to Dr. A. F. Abbassi, Assistant Pathologist, and Dr. A. F. El-Tobgy, Assistant Surgeon, who gave invaluable help in the obtaining of material and the preparation of culture media. The primary purpose of the investigation was to attempt the recovery of bacterium granulosis from cases of trachoma in Egypt.

Egyptian trachoma appeared clinically to differ in no essential feature from trachoma as observed in the white and Indian populations of the United States. The frequent presence of a secondary purulent catarrh, superimposed on the underlying trachoma was noted, particularly in the out-patients attending the ophthalmic hospitals, but it was possible to secure pure, uncomplicated, symptom free trachoma by selecting school children from the orphanage which adjoined the laboratory. While these presented lesions of Trachoma II and III (MacCallan*), evidences of secondary infection were absent.

Sixteen untreated cases were studied. Two of these were infants showing Tr. I, nine were Tr. IIa, and five Tr. III (school children). None showed purulent secretion. Material for cultural purposes was obtained by expression of follicular contents with Prince's ring forceps or, as in the two infant cases, by scraping the tarsal conjunctiva with a platinum spatula. No anesthesia was used in any of the cases.

Two types of culture media were utilized; namely, the semisolid leptospira medium and the special horse blood agar containing sugars, both described by Noguchi in his original monograph.[2] An incubation temperature of 30°C. was used. The trachomatous material obtained by expression and scraping was planted directly into the tubes of semisolid leptospira medium, which were sealed with tinfoil to retard drying, and also smeared heavily over the blood agar plates. In certain instances the material was first triturated in sterile mortars with salt solution before inoculation. This procedure was eventually abandoned as in spite of strictest precautions dust contaminants invariably crept in. All plates were sealed with adhesive for the double purpose of retaining moisture

* MacCallan's Classification:
Tr. I Incipient trachoma
Tr. II Established trachoma
(a) follicles predominant
(b) papillae predominant
Tr. III Cicatrizing trachoma
Tr. IV Cicatrized trachoma

and of keeping out dust. Dust contamination was incidentally a great source of trouble in the preparation of culture media.

The plates were examined first on the sixth day and at intervals for twelve days or more. Colony growths were identified by smears and those having the drop-like appearance of B. granulosis colonies were picked into tubes of semisolid leptospira medium. Once the plates had been opened moulds and other air contaminants rapidly overgrew everything. The tubes of semisolid leptospira medium were also examined on the sixth day, smeared, and plated out on blood agar from which the colony forms were studied as in the original plates. The technique used was identical with that by which B. granulosis had been successfully isolated from cases of trachoma in white persons and Indians in America.[8]

Following is the bacterial flora found in each case:

CASE 1
(a) Corynebacterium xerosis
(b) Staphylococcus
(c) Long Gram-negative rod, unidentified
(d) Short minute Gram-negative rod very similar morphologically to B. granulosis

CASE 2
(a) C. xerosis
(b) Staphylococcus
(c) Diphtheroids
(d) Gram-negative rod, larger than B. granulosis, having a tendency to polar staining; unidentified

CASE 3
(a) C. xerosis
(b) Staphylococcus
(c) Short-chained streptococcus
(d) Gram-positive diplococci, morphologically like the pneumococcus

CASE 4
(a) C. xerosis
(b) Staphylococcus
(c) Gram-positive diplobacillus morphologically like the Morax bacillus

CASE 5
(a) C. xerosis
(b) Staphylococcus
(c) Gram-positive diplobacillus morphologically like the Morax bacillus
(d) Large Gram-negative rod, unidentified
(e) Minute Gram-negative rod morphologically like B. granulosis
(f) Gram-positive spore-bearing rod (hay bacillus)

CASE 6
(a) C. xerosis
(b) Staphylococcus
(c) Small Gram-negative rod morphologically and culturally like B. Koch-Weeks
(d) Long-chained streptococcus

CASE 7
(a) C. xerosis
(b) Staphylococcus
(c) Gram-positive spore-bearing rod (hay bacillus)

CASE 8
(a) C. xerosis
(b) Staphylococcus
(c) Large Gram-positive rod, probably diphtheroid
(d) Large Gram-negative rod, unidentified

CASE 9
(a) C. xerosis
(b) Staphylococcus
(c) Small Gram-positive rod, probably diphtheroid
(d) Large Gram-negative rod, unidentified
(e) Small Gram-negative rod morphologically like B. granulosis

CASE 10
(a) C. xerosis
(b) Staphylococcus
(c) Gram-negative diplococcus

CASE 11
(a) C. xerosis
(b) Staphylococcus (white)

CASE 12
(a) C. xerosis
(b) Staphylococcus
(c) Small Gram-negative rod morphologically like B. granulosis

CASE 13
(a) C. xerosis
(b) Staphylococcus (white)

CASE 14
(a) C. xerosis
(b) Staphylococcus
(c) Small slender Gram-negative rod with some longer thread-like forms. Culturally like B. Koch-Weeks

CASE 15
(a) C. xerosis
(b) Sarcina
(c) Staphylococcus
(d) Short-chained streptococcus
(e) Gram-positive diplococcus morphologically like the pneumococcus
(f) Large Gram-negative rod, unidentified
(g) Small Gram-negative rod morphologically similar to B. granulosis

CASE 16
(a) C. xerosis
(b) Staphylococcus (white)

In interpreting the above results, the tremendous dust contamination present in Egypt must be taken into consideration and it is probable that some of the bacteria described are air contaminants lodging incidentally in the conjunctival sac or contaminating the media at the time of inoculation. It will be noted, however, that the Koch-Weeks bacillus was found in two cases, the Morax bacillus in two, and the pneumococcus in two. In none of these six cases were the usual symptoms of secondary infection present. Small Gram-negative rods bearing a morphological resemblance to B. granulosis were recovered from five cases and these were brought back to the United States for further study along with a number of other unidentified Gram-negative rods which differed markedly in one respect or another from Noguchi's bacterium. The characteristics of the five morphologically characteristic strains will be described in detail.

Strain C. 1. Small Gram-negative rod indistinguishable morphologically from B. granulosis. Yellowish-white confluent growth on blood agar, more opaque than growth of B. granulosis and less mucoid. Grows well on all ordinary laboratory media at temperatures ranging from 20° to 37°C. No spores formed. Young cultures are actively motile. Not agglutinated by B. granulosis anti-serum. Ferments none of the 21 sugars tested.* Nonpathogenic for the conjunctiva of the Macacus rhesus monkey. Produces severe purulent iridocyclitis on injection into the anterior chamber of the rabbit's eye.

Strain C. 5. Small Gram-negative rod indistinguishable morphologically from B. granulosis. Growth on blood agar moist, confluent, and sticky, but colonies slightly more opaque than B. granulosis. After repeated subculture on plain agar, yellow pigment developed. Grows well at temperatures ranging from 20° to 37° C. No spores formed. Young cultures actively motile. Ferments none of 21 sugars tested and fails to agglutinate in B. granulosis antiserum. Nonpathogenic for conjunctiva of M. rhesus monkeys. Produces no reaction on injection into the anterior chamber of the rabbit's eye.

Strain C. 9. Small Gram-negative rod indistinguishable morphologically from B. granulosis. Growth on blood agar moist, sticky, and confluent. Old colonies become quite opaque but are not pigmented. Grows well on all ordinary laboratory media at temperatures from 20° to 37°C. No spores formed. Nonmotile. Not agglutinated by B. granulosis antiserum. Ferments none of the 21 sugars tested. Nonpathogenic for the conjunctiva of M. rhesus monkeys. No reaction on injection into the anterior chamber of the rabbit's eye.

Strain C. 12. Gram-negative minute rod with rounded ends. Tendency to diploid arrangement. Average slightly larger than B. granulosis but morphologically similar. Moderately large flat colonies on blood agar with opaque centers and narrow transparent rims. Grows well on all ordinary media at incubation temperatures from 20° to 37°C. No spores formed. Young cultures actively motile. Not agglutinated by B. granulosis antiserum. Ferments none of 21 sugars tested. Nonpathogenic for conjunctiva of M. rhesus monkey. Produces severe purulent iridocyclitis on injection into the anterior chamber of the rabbit's eye.

Strain C. 15 Small Gram-negative rod with rounded ends. Slightly larger than B. granulosis but similar morphologically. Occasional diploid forms. Halo formation in smears suggesting capsule formation. Occasional thread-like forms. Shiny, raised, slightly opaque colonies on blood agar with tendency to confluence. Slight sticky consistence. Nonmotile. Fails to agglutinate with B. granulosis antiserum. Ferments none of 21 sugars tested. Nonpathogenic for conjunctiva of M. rhesus monkeys.

None of the five suggestive strains could be identified with Bacterium

* Raffinose, inulin, glycerol, arabinose, galactose, levulose, saccharose, mannose, dextrine, glucose, xylose, sorbitol, trehalose, inositol, mannitol, rhamnose, dulcitol, lactose, amygdalin, salicin, maltose.

granulosis as all failed to agglutinate with specific Bacterium granulosis antiserum, to ferment sugars, or to produce lesions in the conjunctivae of Macacus rhesus monkeys. Strain C. 5 was most similar culturally and it is possible that a relationship exists.

Failure to isolate B. granulosis from Egyptian trachoma has been reported by Wilson[3] and Abbassi,[4] both of whom ran parallel cultures with me. This failure does not prove the absence of B. granulosis in Egyptian trachoma as the difficulties of isolation are great and small differences in the preparation of culture media and in the technique of isolation used might account for the lack of success. Since my return to the United States, however, I have been able to recover Bacterium granulosis both from Indian trachoma and from the experimental disease in monkeys, using an identical technique but fewer cultures.

Summary

Sixteen cases of uncomplicated trachoma in infants and adolescents were studied bacteriologically in an attempt to isolate Bacterium granulosis. Five minute Gram-negative rods identical morphologically with this organism were recovered, but all differed in one or more biological characteristics. One strain was considered as possibly related to Bacterium granulosis.

The importance of secondary infection in enhancing the virulence of the trachoma virus has been described by various authors, but whether or not C. xerosis and white staphylococcus, as found in cases 11, 13, and 16, considered normal conjunctival inhabitants, can enter into this possible symbiotic relationship with the trachoma virus is a question. No difference in the severity of the disease in these three cases was noted.

C. xerosis and white staphylococcus, constant inhabitants of the normal conjunctiva, were found uniformly in all cases and in three were the only bacteria recovered. In two cases each, the Koch-Weeks bacillus, the Morax bacillus, and the pneumococcus were found, being present probably as saprophytes. Other conjunctival contaminants included streptococci, sarcinae, diphtheroids, hay bacilli, Gram-negative diplococci, and large unidentified Gram-negative rods.

Egyptian trachoma does not appear to differ essentially from trachoma as seen in the American Indians or in the white population of America.

References

[1] Morax, V., and Petit, J., Le trachoma; conjunctivite granuleuse, J. Morax, Paris, 1929.
[2] Noguchi, H. Jour. Exper. Med., 1928, v. 48, suppl. 2.
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CYANOSIS RETINAE

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CHICAGO

A brief discussion of the essential clinical and etiological factors in this interesting condition is given, with references to the literature. The case report gives clinical studies from age two years to death from cardiac failure at age nineteen years. Complete postmortem anatomical findings are reported. The essential causative factor is polycythemia either idiopathic, or compensatory to circulatory insufficiency as in this case. From the Eye Clinic of the University of Chicago.

Through numerous studies made during the last 30 years, a thorough knowledge of the ocular manifestations and of the underlying general disease of cyanosis retinae has been acquired. Its ophthalmoscopic picture is well known and is characterized by very pronounced widening and tortuosity of all the visible blood vessels and a very dark, bluish-purple color of the blood within the vessels. To a very marked extent these findings are usually present in the bulbar conjunctiva, but they are more impressive and seemingly more marked in the fundus where the condition of the blood and blood vessels is the outstanding feature. This fact, namely the impressiveness of the ophthalmoscopic picture of cyanosis retinae, may be one of the reasons why it has been described so many times.

The general disease associated with these cases of cyanosis retinae is either a congenital heart disease with impeded arterialization of the blood or one of the various types of idiopathic polycythemia. Since the latter condition is present as a compensatory measure in the cases of congenital heart disease, it seems very likely that the ophthalmoscopic picture of cyanosis retinae is brought about by a polycythemic condition of the blood or in other words by the following combination of changes: an increased number of red blood cells (hyperglobulia), an increased amount of hemoglobin (hyperchromia), and a more or less markedly increased blood volume (plethora). De Schweinitz and Woods[1] recently established quantitative relations between the polycythemic condition of the blood and the retinal cyanosis. They found that an average of 7,836,000 red blood cells and of 115 percent of hemoglobin was necessary to bring about a definite state of cyanosis retinae. The state in which the hemoglobin is present in the blood, namely oxygenated or reduced, plays a very important rôle also. An extremely high content of reduced hemoglobin in the blood may, therefore, cause the fundus picture of cyanosis, even if the polycythemic condition does not reach the limits found by de Schweinitz and Woods. An extreme degree of local or general cyanosis does not make the eye grounds look cyanotic in the absence of polycythemia. (Leber[2] and others).

The highest degrees of cyanosis retinae are seen in cases of congenital heart disease with stenosis of the pulmonary artery. These cases are extremely rare. Because a survey of the literature reveals anatomical reports in only four cases, I thought it would be worth while to add another case which I had watched over a period of two years after which the eyes were available for anatomical study.

Case Report

L. F., male, 18 years of age. Father of the patient always healthy, died from war injuries; mother died from unknown disease; one brother living and well; no family history of heart disease. Patient has shown blue discoloration of entire skin since he was two years old. At that time he was taken to a pediatric clinic where he was treated for three months without any objective change in his condition. At the age of 5 years it was noticed that the patient became very short of breath on physical exertions. Whenever sitting in a chair, lying in bed, or walk-

ing slowly on a level, he was not dyspneic and felt all right. He was never able to walk upstairs. His condition became steadily worse so that at the age of 14 years he had to be taken to the first medical clinic of the University of Vienna because of severe cardiac difficulties which, after hospitalization for three months, were somewhat relieved so that he could perform very light work for a few months. Then, he was forced again to go to the hospital. Under a régime of alternating bed rest and light work the patient managed to live until the age of 19 years when he died from cardiac failure.

Clinical findings

Very marked and constant general cyanosis of the skin and the visible mucous membranes; clubbing of the fingers; respiration in recumbent position, 20 per minute; pulse 60 (lying quietly in bed or sitting up in a chair); systolic blood pressure 85-95; lungs apparently normal on physical examination; heart moderately enlarged to left and right; apex-beat palpable in the sixth intercostal space one-half inch lateral to the mid-clavicular line; very loud tympanitic first heart-sound heard on auscultation over the apex, second sound normal. In the second intercostal space on the right and left side a rough systolic murmur, a clear second sound, and diastolic murmurs were heard. Blood count and the results of the blood-gas-analysis are given in Table I. Incidentally a situs inversus viscerum was present as demonstrated by x-ray examination of the colon after a barium enema had been given.

Clinical eye findings

Slight bilateral exophthalmus; the conjunctival and anterior ciliary vessels much wider and darker than normal; irides dark brown, no visible blood vessels; lenses clear.

Fundi: (fig. 1) The discs were purple red with very indistinct margins and definite swelling of from 2 to 3 diopters in each eye. The surrounding retina was perfectly clear. Choroidal structures were not visible because of the heavily pigmented pigment epithelium. The entire eye-ground was of a dark purplish color and the whole vascular tree enormously widened with the veins showing this dilatation more markedly than the arteries. Several large vessels were seen in every field of the direct ophthalmoscope. The vessels were extended into the macular area and disappeared very close to the foveal reflex. The arteries and the veins were accompanied by very pronounced wide reflex stripes. The caliber of the vessels showed only very gradual changes. There were no abrupt narrowings or widenings. The blood in the arteries was of an intense dark-red color, the venous blood was almost black. There were no hemorrhages nor any other lesions at any time.

Table I.

	Normal	*Cyanosis retinae Case L. F.*
Blood pressure, systolic	120	85–95
White blood cells	6000	4000–5000
Red blood cells	5,000,000	8,500,000
Total hemoglobin		
percent (Sahli)	90	140–160
in cc. of O_2 per 100 cc. of blood	18.0	31.53
Oxyhemoglobin in percent of total Hb		
arterial blood	96.0	53.59
venous blood	65.0	44.83
Reduced hemoglobin in percent of total Hb		
arterial blood	4.0	46.41
venous blood	35.0	55.18
Oxygen content in cc. per 100 cc. of blood		
arterial blood	20.0	18
venous blood	12.0	9
Carbon dioxide in cc. per 100 cc. of blood		
arterial blood	44.0	41.69
venous blood	50.0	52.17

Vision R.E. = 6/6, refraction + 1.50 sph.

Vison L.E. = 6/18, refraction

Vision L.E. = 6/18, refraction + 4.25 sph. + 0.75 cx 90°.

Patient remembered that up to the age of 6 years the left eye was turned in. Tension R.E. and L.E. = 15 mm. Hg. External ocular movements, accommodation, adaptation, and visual fields, taken on several occasions were found normal. Only the blind spots

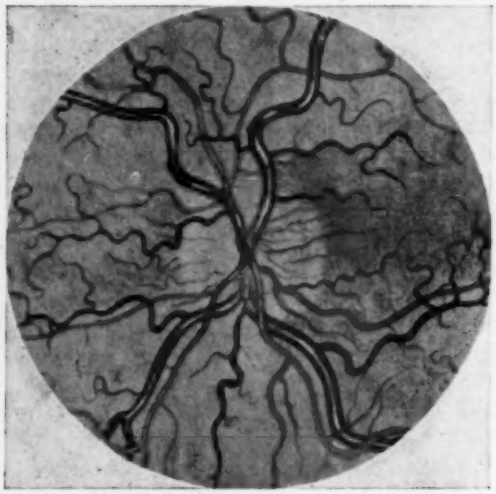

Fig. 1 (Kronfeld). Photograph of the fundus drawing made by Professor Dietz (Vienna).

were moderately enlarged with narrow "arcuate", absolute scotomata extending from their upper and lower margins 10 to 15 degrees into the visual field.

The fundi were found unchanged on many occasions during the last two years of the patient's life. The swelling of both discs, which seemed to fall in the group of clear-cut choked discs, remained the same. Hemorrhages or sudden changes of the caliber of the vessels were never observed. On December 14, 1925, the patient was presented before the Ophthalmological Society of Vienna[8] where Professor Dimmer was, at that time, director of the second eye clinic. He took photographs of the patient's fundus and published them on page 59 of his "Atlas of Fundus Diseases". The patient died about a year later. The autopsy was done 16 hours after death had occurred. At the same time the eyes were enucleated, fixed in Mueller-Formol solutions, embedded in Celloidin, cut serially and stained by the usual methods.

Autopsy report

The autopsy did not reveal any unexpected findings. The diagnosis of situs inversus of the intestines was confirmed. The moderate enlargement of the heart was produced primarily by a hypertrophy of the right ventricle. The lumen of this ventricle measured $7 \times 3 \times 2\frac{1}{2}$ cm. and its wall 2 cm. in thickness. The left ventricle, on the other hand, was very small and its wall measured 1 cm. in thickness. The left atrium was very small also, with a diameter of $2\frac{1}{2}$ cm. and received the pulmonary veins by means of one short common stem. The atrioventricular valves were normal except for some thickening of the leaflets. The right atrium was very much dilated and was the size of a child's fist. It received the hepatic veins from below, and a large vein from above which will be described later.

There was a round defect in the septum ventriculorum, about 7 mm. in diameter. This defect lay in the most anterior part of the septum. Directly over this defect the aorta took its origin, so that its opening appeared to be straddling on the septum. The aorta had three semilunar leaflets which showed verrucous and polypous excrescences at their edges. The vessel corresponding to the normal pulmonary artery was represented by a very narrow artery, originating from the *left* ventricle, then branching into two smaller vessels, each running to its respective hilus of the lung. The left one was connected with the aorta by a strand of connective tissue, the ductus Botalli. The aorta, after emerging from both ventricles, took the normal course, bending over the left main bronchus backwards and lying to the left of the vertebral column on its way through the mediastinum.

The main vein took a very atypical

course. From the right atrium into which it emptied from above it passed straight up first receiving the jugular and subclavian veins from each side, then curved downward just to the left of the aorta following this artery on its left to the diaphragm where it crossed behind the aorta to the right side and finally went through the diaphragm almost like a normal inferior cava.

The pathological diagnosis was: Congenital heart disease; occlusion of the pulmonary artery; defect in the septum ventriculorum; transposition of the large vessels; persistence of the left cardinal vein; situs inversus viscerum abdominalis; chronic endocarditis of all valves.

The mechanism of the circulation in this case can easily be understood. The right atrium received the venous blood from above through the large vein which represented both venae cavae and from below, through the hepatic veins. During the diastole the venous blood filled mainly the right and, because of the defect in the septum, the left ventricle to a lesser extent. During systole both ventricles expelled their blood. A very small part of it left the heart through the pulmonary artery. Because of the excessive narrowness of the latter the pathologist felt that it was necessary to assume that the lungs received a comparatively large amount of blood through the bronchial arteries. The blood that actually entered the lungs became arterialized and returned to the heart through the pulmonary veins. This arterial blood entered the left ventricle during the diastole, was mixed with the venous blood present there, and expelled at the next systole through the aorta. The arterial blood in this case always was a mixture of arterial and venous blood. The actual proportion was figured out from the data obtained by analysis of the peripheral blood and was found to be between 1 :5 or 1 :4. This made the oxygen content and the oxygen tension in the blood very low. The organism responded to the oxygen hunger of the tissues with a compensatory mechanism, namely, an increase in the amount of oxygen carriers in the blood.

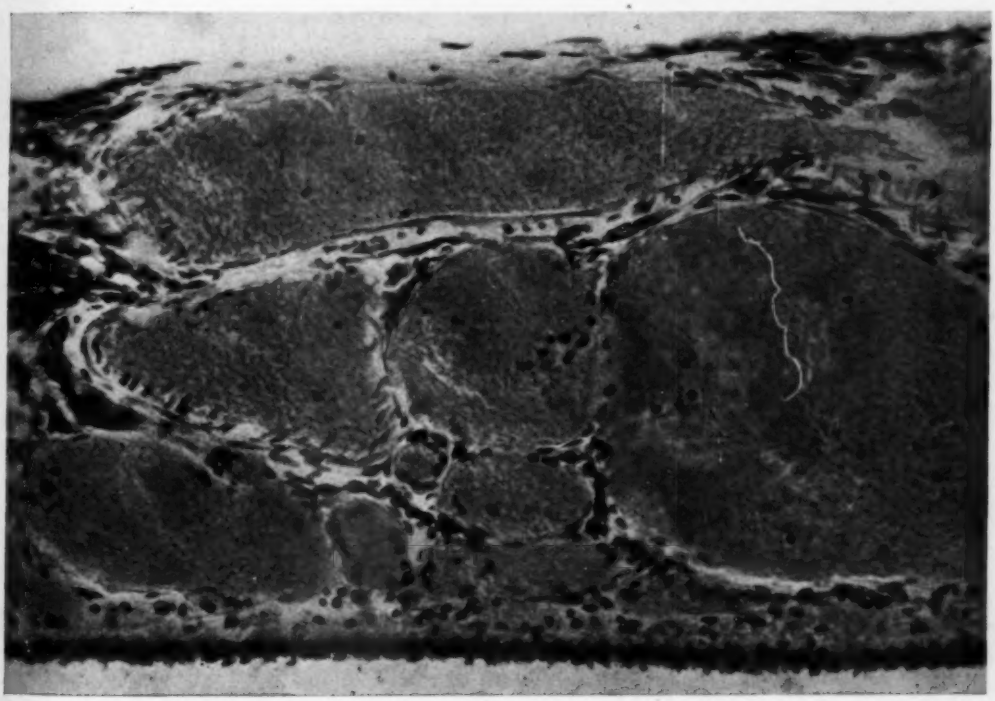

Fig. 2 (Kronfeld). Cross section through the choroid near the posterior pole.

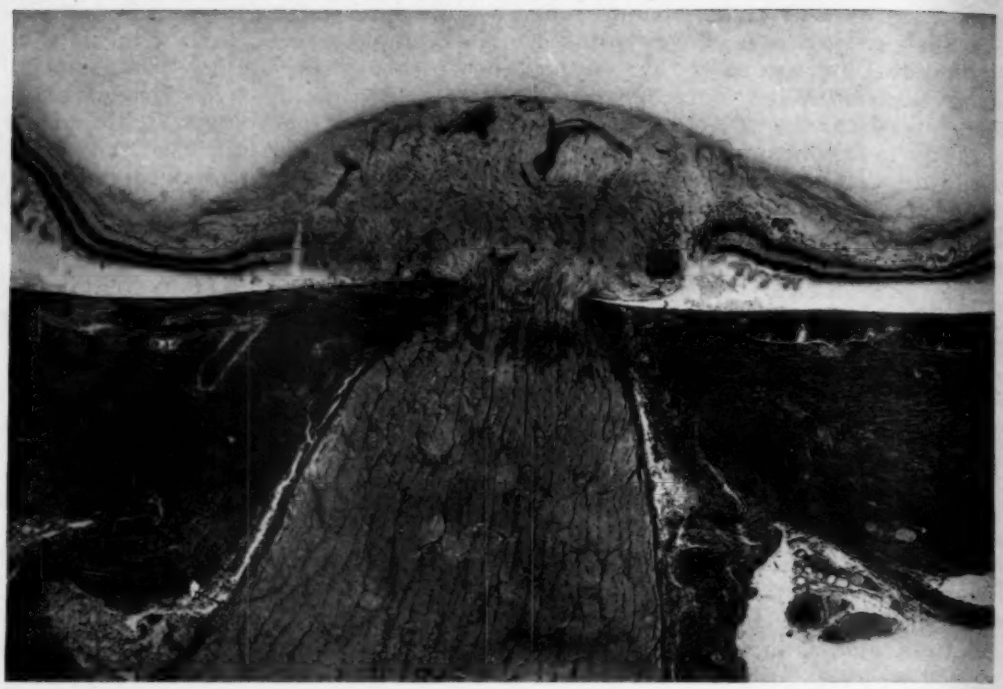

Fig. 3 (Kronfeld). The nerve head in case L. F. There are innumerable capillaries and no inflammatory cells. The lamina cribrosa is perfectly straight.

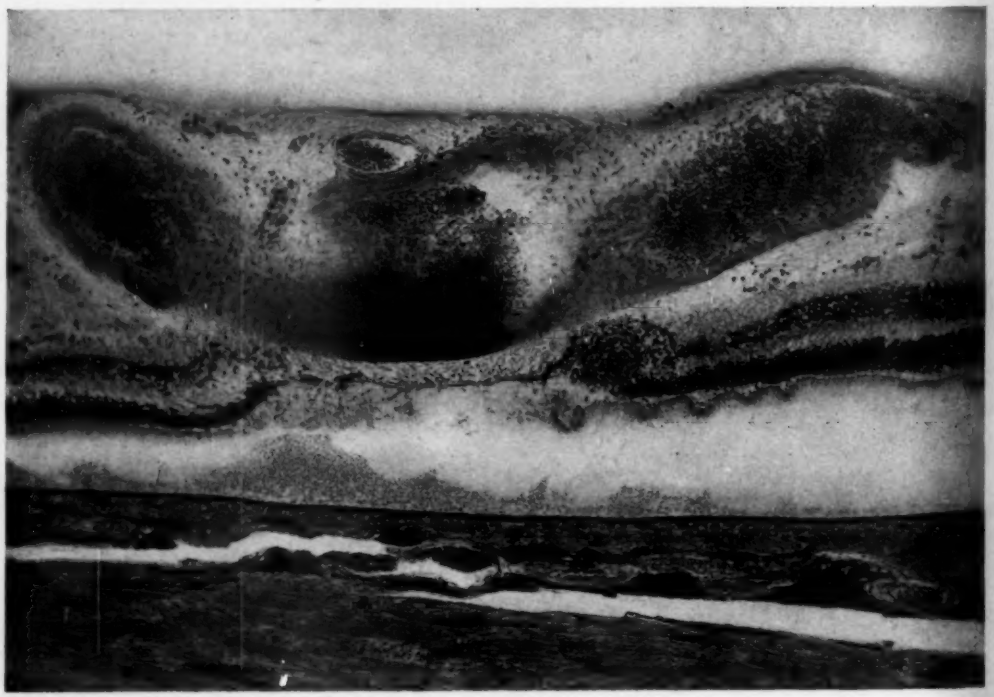

Fig. 4 (Kronfeld). Tangential section through a large vein near the disc.

This response probably could not be carried out without increasing the total blood volume which in turn might represent another compensatory mechanism which forced the vessels to widen, slowed down the circulation, and made the gas exchange between tissue and blood easier and more complete. Thus polycythemia plus plethora were produced by the hematopoetic system to compensate for the poor arterialization and to raise the oxygen content of the blood up to normal. Thus our patient managed to live for 19 years, though under the greatest restrictions.

His eyes functioned normally, so far as we could tell from studying central and peripheral visual acuity, adaptation and color perception. The circulation, despite all its difficulties, was good enough to supply the retina with all the oxygen necessary and to remove all the cleavage products.

Anatomical eye findings

The anterior segments were essentially normal, excepting for the irides which showed a slight increase of capillaries and small vessels, and the vascular layer of the ciliary body which contained an increased number of longitudinal and cross-sections of vessels. These vascular changes were, however, still more marked in the posterior segment. The choroid was approximately twice as thick as normally with its thickest portion at the posterior pole. It had the appearance of an angioma (fig. 2). The interstitial tissue was reduced to almost nil and the entire space was taken up by the very hyperemic choriocapillaris and extremely dilated arteries and veins in the other layers. The normal arrangement in layers was maintained throughout. Most of the vessels were filled with blood cells among which very few white cells were noted.

Owing to the fact that the normal choroid contains more veins than arteries it was to be expected that in a case of uniform dilatation of the vascular bed the engorgement of the venous system would be more pronounced than that of the arteries. There could be no doubt, however, that the arteries were very widely distended also.

The entrance of the optic nerve showed a typical choked disc with swelling in the plane of the retina and protrusion into the vitreous. The nervehead contained surprisingly many capillaries. The lamina cribrosa did not show any deviation from its normal straight course.

The retrobulbar portion of the optic nerve looked somewhat crowded within the tight pial sheath. It was free from inflammatory cells.

The retina, probably, was the membrane the structure of which was most severely altered by the vascular dilatation, inasmuch as the large vessels in several places occupied its entire thickness (fig. 4) and touched the pigment-epithelium. Where this was the case, the retinal vessel carried a coat of dark brown pigment peripheral to its adventitia (fig. 5). By the intimate contact between pigment-epithelium and the pulsating vessel wall some pigment had been rubbed off and taken up by the glial elements in the adventitia as J. Friedenwald recently described in a case of retinitis pigmentosa.

It was only the large vessels which influenced the structure of the retina so severely and actually bisected it in many places. They were very tortuous and made many short curves in the plane of the retina and in the anteroposterior direction, thus indicating that the entire vascular bed was widened and lengthened. The capillaries behaved normally throughout and stayed within their normal limits. Many sections stained after Weigert's method for medullated sheaths were searched and no capillary was found external to the inner third of the outer reticular layer.

The retinal and choroidal vessels were studied very thoroughly for anatomical changes of their walls. Special staining methods were applied to bring out the elastic layers. These studies showed the walls to be esentially normal. The vessels were wider in caliber, but otherwise not altered anatomically in any way.

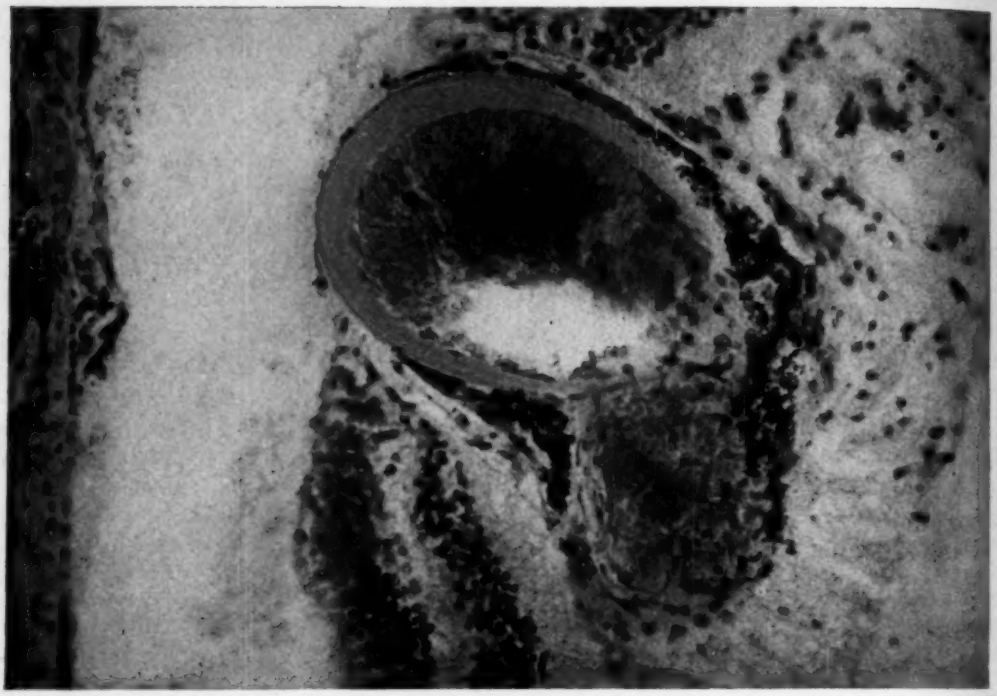

Fig. 5 (Kronfeld). The microphotograph shows a large retinal vein touching the pigment epithelium and carrying black pigment granules in its adventitia.

The anatomical eye findings in this case can be summarized as enormous dilatation of the entire vascular system in all its parts. From the fact that a vascularization of the first retinal neurone had not occurred, it can be concluded that only preformed vessels underwent this dilatation and that there was no active proliferative tendency as a result of the oxygen hunger of the tissues. Each vessel widened to a certain extent, probably just yielding to the increased blood volume as de Schweinitz[4] suggested.

In regard to the presence of choked disc in these cases, several explanations have been offered. In our case we found that the swelling remained constant for over two years, and did not lead to the slightest signs of atrophy. The brain was found normal outside of slight diffuse edema and enormous dilatation of all the blood vessels. These two factors, if they had developed since the skull assumed its final fixed shape and size may have been responsible for the swelling of the optic nerves* Or else it can be assumed that the large central vessels occupied too much space and thus crowded the nerve fibers within the pial coat. Behr believes that the lymph stream within the optic nerve becomes insufficient because of a greater amount of lymph being produced from the innumerable capillaries, embedded in the nervehead. The swelling of the nervehead could also be explained on the same basis as in other diseases of the hematopoetic organ (leukemia).

A comparison between the anatomical findings in this case and those previously found by other authors was very interesting because the conclusion could be drawn that the cases of congenital heart disease with cyanosis reti-

* A. Boettner (Deutsches. Archiv fuer klinische Medizin vol. 132: 1, 1920) found the cerebrospinal fluid pressure increased in late stages of idiopathic polycythemia. He believed that the high pressure was due to the increased volume of the hyperemic and edematous brain in those cases.

nae can be divided into two groups; namely, those with normal function of their eyes and those with disturbed function. This differentiation is justified from the ophthalmologist's point of view and, at the same time, seems to be valuable for the internist also. In the first group which contains the cases with normal eye function, can be placed the brief reports of cases described by Knapp[5] in 1861, Brailovskij and Glekler[6] in 1927, and the case reported in this paper. In Knapp's case the blood vessels were enormously dilated, but otherwise normal. In the case of the Russian authors the posterior segment was described as free from pathological changes. My patient would fall in this group because the function of his eyes was normal as long as he lived and the anatomical examination did not reveal any changes that would have suggested the possibility of the occurrence of eye lesions if the patient had lived longer.

In the second group we find very characteristic eye changes. The arteries show very severe endarteriitis which lead to multiple arterial thrombotic occlusions with secondary changes in the veins, massive hemorrhages, and to the usual ultimate complication, secondary glaucoma. The first case in this group was that of Baquis[7] which was published in 1908. Before Baquis, Goldzieher[8] observed clinically a case of spontaneous rupture of an eye with secondary hemorrhagic glaucoma in a patient with congenital heart disease and cyanosis retinae in the other eye. The third case in this group is that described by Ginzburg[9] in 1928.

The severe alterations of the vessel walls which are found in this group can be recognized ophthalmoscopically also. The arteries are not evenly dilated as they are in the first group, but are so extremely narrow as to be almost invisible, as was observed by Baquis. The cases of the first group always have a low blood pressure while those of the second group have a more or less marked hypertension which may be either nephritic in origin or may represent another attempt of the organism to get better oxygenation of its blood. By a spastic contraction of the vessels of the major circle, the proportion of blood that goes through the pulmonary artery into the lungs, is bound to increase (Baquis). This spastic contraction then leads to anatomical changes in the walls of the arteries, endarteritis and arteriosclerosis with all their consequences for the function of the organ.

The eye findings in idiopathic polycythemia and in congenital heart disease, are found to be almost identical. Behr's[10] anatomical description of a case of primary polycythemia seems to agree in every detail with the findings in my case. It is, therefore, my belief that the polycythemia as the main factor in producing cyanosis retinae should be included in the fundus diagnosis in these cases and that we should speak of a polycythemic cyanotic fundus in congenital heart disease which is just a higher degree of the polycythemic fundus in idiopathic polycythemia.

I am greatly indebted to Professor H. Eppinger and Professor H. Maresch of the University of Vienna for the description of the clinical and postmortem findings in this case.

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BILATERAL HOLE AT THE MACULA

G. C. KREUTZ, M.D.
DETROIT

A brief review of the literature is given and a case reported in which a hole at the macula of each eye developed at different times as the result of injury by a blunt instrument.

Hole at the macula, first described by Knapp in 1869, and Noyes in 1871, apparently is not of infrequent occurrence. Ogilvie[1] collected 27 cases reported up to 1900 and went into the mechanics, anatomy, pathology, and literature in a thorough manner. Clapp[2] reporting a case in a colored boy, who

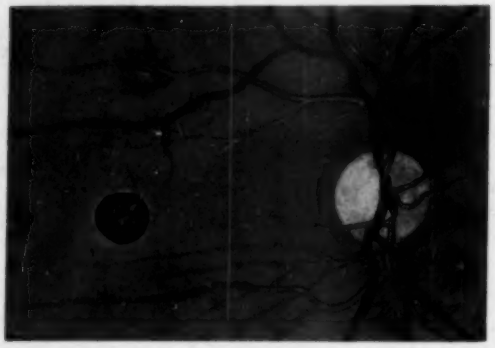

Fig. 1 (Kreutz). Hole at the macula; right fundus.

came under his observation, reviewed the literature on the subject and summarized the theories as to its causation. Sautter[3] and Zentmayer[4] each described cases in colored patients.

That this clinical entity is frequently overlooked as a cause of unilateral poor visual acuity is well demonstrated by the fact that Middleton[5], was able to find twenty-three such cases in routinely examining recruits during the World War. Thirteen of his cases occurred in negroes, half of whom had a history of luetic infection. White recruits in his camp outnumbered the colored five to one. Maxey[6] reported three additional cases in negroes, two of them luetic. Middleton[5] minimized the interesting coincidence that most of the cases occurred in negroes and did not attach particular importance to the luetic infection. It is not unlikely that both of these factors are of some significance since luetic negroes comprise a seemingly undue proportion of the reported cases. Trauma, in the form of severe contusion to the eyeball, was the usual inciting cause although Parsons[7] states: "The condition may certainly arise from disease without trauma".

The following clinical record is reported because nowhere in the literature have I been able to locate a similar case. It is the history of a bilateral hole in the retina at the macula which occurred in a young adult negro, whose

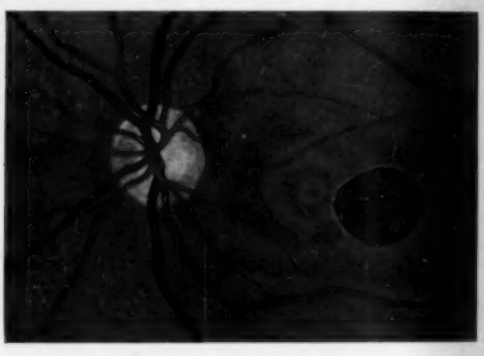

Fig. 2 (Kreutz). Hole at the macula; left fundus.

right eye was severely contused in 1916, and the left eye twelve years later.

V. T., aged 36 years, colored laborer, was first seen several hours after having been struck in the eye by the crank of a tractor. Examination at that time (May, 1927) showed a small laceration of the upper eyelid, but no injury to the cornea, iris, or lens. The fundus showed a globular subhyaloid hemorrhage and considerable edema at the macular region. In due time, the blood absorbed and what had been an edematous macula, resolved itself into a punched out, crater-like hole at the

macula, slightly more than a disc diameter in width, devoid of peripheral pigmentation, but with a rough base covered with a deep brown substance not unlike a mass of cholesterin crystals. The sclera could not be seen. The balance of the fundus was not unusual. Central vision was lost. Visual acuity was 6/60 and could not be improved with lenses. The right fundus was identical in appearance with that of the left eye except that the retinal defect was smaller, and here, too, the patient's visual acuity was not more than 6/60, with loss of central vision. A history of a severe blow to the eye by a batted baseball twelve years previously following which the patient had lost most of his useful vision, was elicited.

A complete physical examination did not reveal much of interest, but there was a positive Wassermann reaction in the blood and spinal fluid. Intensive antiluetic treatment over a protracted period was without effect upon the visual acuity.

The case is reported because of its rarity and because it raises several interesting questions. Is the colored race more susceptible to traumatic macular disease? Are luetics with their tendency to vascular degeneration more susceptible to this affliction? Are certain individuals, otherwise normal, more liable than others to sustain macular injury following a severe blow to the eye? In this case, we have a combination of two of these factors—namely, race and infection. An unusual percentage of reported cases seems to have occurred in luetic negroes. The vulnerability of the macula to disease is well established, yet, the percentage of cases showing a hole at the macula is small compared with the total number of severe contusions to the eyeball that come under the care of the oculist.

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VARIATIONS IN THE NORMAL BLIND SPOT WITH SPECIAL REFERENCE TO THE FORMATION OF A DIAGNOSTIC SCALE

II. The color blind spot

H. A. WENTWORTH, PH.D.
PHILADELPHIA

This is the second of a series of papers on the subject. The author gives the results of a series of careful measurements of the area of the blind spot using blue, red, and green stimuli. The same subjects were used as in the previously reported measurements using form stimuli. The results show an increase in the average area of the blind spot for colored stimuli in order named of 33 percent, 58 percent, and 98 percent over the average size for form stimuli. From the Department of Ophthalmology, School of Medicine of the University of Pennsylvania.

That changes in the size and shape of the blind spot are closely correlated with various pathologic conditions among which may be mentioned particularly glaucoma, papilledema or choked disc, pathogenic myopia, and infections and inflammations of structures closely surrounding the optic nerve, notably the sinuses, is so well known that it needs no further comment. It has also been shown that the value of these variations in the blind spot as a sensitive diagnostic and prognostic test of pathologic changes is directly dependent upon a knowledge and control of all variable factors which may effect changes in the size and shape of the blind spot under normal conditions, that is, in non-pathologic eyes. These factors as we have pointed out in previous papers both in collaboration with and reiteration of Ferree and Rand, fall into two groups: (1) Those factors which effect the precision and reproducibility of results from time to time for any given eye and which may be eliminated or reduced to a satisfactory minimum; and (2) those factors which cause variation from eye to eye and from person to person the majority of which are not amenable to control and for which a corrective allowance must therefore be made. This allowance may be made by presenting the results in the form of a frequency graph showing the distribution of cases about a mid value. A graph of this type when extended to include a sufficient number of normal cases so as to include as many as possible of the factors the influence of which cannot be eliminated and then to include the various pathologic conditions which effect changes in the blind spot, for obviously the normal variation is of importance only in its relation to the pathologic, may serve as a diagnostic scale such that any blind spot obtained under like conditions may be immediately classified in relation to the various normal and pathologic groups represented. It is in the interest of forming such a scale that the study of the form blind spot presented in an earlier paper, and the present study of the color blind spot in normal eyes has been undertaken.

In case of the color blind spots, however, little exact data has previously been obtained. Gradle reports that Hannover, Donders, Snellen, and Landolt agreed with Aubert that the blind spot was greater for colors than for white. Van der Hoeve, using 1.5 and 1 cm. discs on a black screen at 2 meters distance found that in 40 of 100 eyes tested, red and blue were recognized in the same region as white but in 59 cases a zone was found 1/8°-3/4° in width which was relatively blind to color. The data for green was discarded as unreliable. Peter, who found the same condition at 1 or 2 meters but not at shorter distances, states that recognition of color in discs small enough to make accurate and sharp discriminations is too uncertain at 1 or 2 meters distance, due to loss of saturation and distinctness of the color, to furnish trustworthy evidence. He

therefore denies the presence of this zone in normal eyes and considers it, when found, a valuable evidence of pathology. Baas found a zone of relative color blindness of about 1°, with red and blue observed at approximately the same spots. He found the zone smaller but still existent when obtained at the perimeter distance. Berry and Haycraft, using nail heads, painted so as to give equal luminosity when viewed through Abney's sectors, found that on a black background, red was seen first as gray, then orange, yellow and finally red; green as gray, then yellow, then green; and blue as gray, then blue. When the stimulus was moved from the center of the blind spot outward the colors were recognized in the order blue, yellow, green, red. The numerical value of these zones was not stated. Incze found that red and blue were recognized at the same place as white but green was first seen as gray.

In practically every case the findings as to the color blind spot have been given merely as a supplementary statement to the study of the blind spot for form with little or no indication of the conditions of experimentation, or the exact values obtained. So far as the writer knows, her own studies of the color blind spot published in collabora-

Table 1

BLIND SPOTS FOR CHROMATIC STIMULI: AREA IN SQUARE CENTIMETERS

Stimulus:	Blue	Red	Green		Blue	Red	Green		Blue	Red	Green		Blue	Red	Green
Case No.				Case No.				Case No.				Case No.			
1	13.3	16.3	17.9	51	13.7	15.6	21.6	101	15.2	19.0	23.6	151	14.4	17.9	21.3
2	12.5	14.4	17.9	52	13.3	15.6	22.8	102	14.0	20.1	24.7	152	16.0	18.6	21.6
3	13.7	16.0	22.8	53	12.2	13.3	18.2	103	13.7	16.0	18.2	153	13.7	17.5	23.2
4	16.3	20.1	22.8	54	14.0	15.2	19.4	104	11.4	15.2	19.0	154	15.6	19.0	24.3
5	9.5	11.4	25.1	55	15.6	19.0	21.6	105	12.2	15.2	18.2	155	13.3	15.6	18.6
6	12.5	16.0	23.6	56	16.7	21.3	26.2	106	17.9	22.0	26.6	156	12.2	14.8	17.5
7	17.9	19.8	28.9	57	14.4	19.8	25.8	107	19.0	23.2	27.8	157	14.0	17.5	20.5
8	19.0	24.3	27.0	58	18.2	21.3	24.7	108	17.1	19.0	24.7	158	14.0	17.9	22.8
9	15.6	16.0	23.2	59	9.9	10.3	11.8	109	16.0	16.0	23.6	159	16.0	17.9	23.2
10	12.9	16.7	19.8	60	10.6	12.9	14.8	110	14.4	17.1	23.9	160	11.0	12.5	15.2
11	15.2	20.9	25.8	61	11.8	15.6	20.1	111	11.0	12.2	16.7	161	12.5	14.8	19.0
12	16.0	19.4	22.0	62	14.0	15.2	17.1	112	14.0	16.0	20.9	162	11.8	14.8	18.2
13	15.2	15.6	25.4	63	19.8	22.8	26.6	113	13.3	13.3	23.2	163	10.6	12.2	14.0
14	9.1	13.7	17.5	64	17.9	21.6	26.2	114	19.0	20.5	26.6	164	9.5	11.4	14.4
15	17.5	22.4	26.2	65	25.8	29.6	43.6	115	12.5	17.1	20.9	165	11.8	11.8	14.8
16	16.0	19.8	22.8	66	17.1	22.8	26.6	116	11.4	12.9	15.2	166	11.0	13.3	15.6
17	17.1	19.0	26.2	67	14.0	17.5	22.8	117	18.2	20.9	24.3	167	17.5	20.1	25.8
18	19.0	24.7	27.8	68	16.0	18.6	24.3	118	19.0	21.3	21.6	168	17.1	20.9	28.1
19	16.3	23.6	24.7	69	15.6	20.5	27.4	119	14.4	18.2	20.9	169	8.4	10.6	16.7
20	17.9	22.4	27.4	70	19.0	23.6	36.4	120	14.0	16.3	19.4	170	10.6	12.2	15.2
21	13.3	20.1	23.6	71	11.4	11.8	15.2	121	12.2	14.4	17.1	171	16.0	17.9	21.6
22	14.8	17.9	21.6	72	13.3	16.7	22.8	122	13.3	14.0	21.6	172	16.0	18.2	20.9
23	11.4	12.2	15.2	73	25.1	30.0	30.8	123	13.7	14.4	20.5	173	18.2	19.0	27.8
24	13.3	17.1	20.1	74	20.1	24.3	27.8	124	14.8	16.3	19.8	174	17.9	23.2	32.3
25	19.1	21.3	24.7	75	14.4	19.0	22.8	125	13.7	14.8	20.9	175	14.4	19.0	30.4
26	13.7	18.2	22.4	76	14.8	15.2	19.0	126	10.6	11.4	18.2	176	17.9	23.9	30.4
27	17.1	16.7	24.7	77	17.9	22.8	34.5	127	13.7	17.5	31.9	177	16.3	20.5	25.8
28	13.7	13.7	22.4	78	17.1	22.8	30.4	128	19.8	24.7	37.2	178	19.0	23.9	30.0
29	12.9	13.3	29.6	79	16.0	19.0	22.8	129	16.7	20.5	24.3	179	14.0	16.0	20.9
30	17.1	22.0	32.3	80	11.8	16.7	20.1	130	17.9	20.9	25.8	180	17.1	17.9	23.9
31	17.5	22.0	24.7	81	16.7	19.0	34.5	131	14.8	21.6	31.6	181	14.0	16.7	22.0
32	17.1	22.0	26.6	82	17.5	21.3	30.4	132	17.9	23.2	31.6	182	13.7	16.0	24.7
33	15.6	18.2	22.8	83	16.7	23.2	26.6	133	12.9	15.2	17.9	183	16.3	19.0	23.9
34	11.4	16.3	22.8	84	19.4	25.1	29.6	134	15.6	16.3	20.9	184	16.0	17.5	22.8
35	21.3	24.3	31.2	85	7.6	9.1	11.4	135	16.7	20.5	25.8	185	14.0	16.3	22.0
36	17.1	22.0	26.6	86	10.6	12.5	17.9	136	18.2	21.3	27.0	186	9.5	12.2	17.9
37	17.5	22.4	24.7	87	13.3	15.6	20.1	137	17.1	19.0	22.8	187	9.9	11.4	14.8
38	16.3	19.0	23.6	88	15.2	17.9	20.9	138	17.5	20.9	26.2	188	11.4	12.9	16.0
39	10.6	11.0	12.5	89	13.3	15.6	19.0	139	12.5	14.4	18.2	189	17.1	21.3	24.7
40	11.4	14.4	19.8	90	12.2	14.4	16.7	140	11.4	14.8	20.1	190	17.5	22.4	25.8
41	12.9	14.0	20.9	91	16.7	16.3	20.5	141	15.2	17.5	21.6	191	8.8	11.4	14.8
42	14.4	16.3	22.4	92	16.0	19.8	23.6	142	19.0	26.2	31.6	192	9.1	11.0	12.5
43	13.3	14.0	17.1	93	12.9	16.7	20.9	143	12.5	15.2	17.9	193	11.4	12.9	16.0
44	14.0	16.7	20.1	94	14.0	17.1	21.3	144	12.2	14.0	16.7	194	10.6	11.4	14.4
45	13.3	17.1	19.0	95	11.4	14.0	17.1	145	17.1	18.6	28.1	195	17.9	19.0	33.0
46	15.2	17.5	21.3	96	12.5	16.7	19.0	146	17.9	18.6	30.8	196	16.7	19.8	27.8
47	11.4	14.4	17.5	97	14.8	19.8	22.8	147	11.8	14.4	16.7	197	12.5	16.0	20.1
48	15.2	16.3	21.3	98	13.3	15.2	19.0	148	11.4	14.0	17.1	198	14.4	19.4	24.3
49	15.2	20.1	28.9	99	12.5	14.0	16.0	149	13.7	13.3	15.2	199	16.3	20.9	25.1
50	15.2	17.1	24.7	100	12.2	14.0	16.3	150	11.0	13.3	17.1	200	11.8	15.2	20.5
											Average		15.11	17.99	22.58

Table 2

BLIND SPOTS FOR CHROMATIC STIMULI: AVERAGE AND RANGE OF MEASUREMENTS FOR 200 NON-PATHOLOGIC EYES

		Area			Breadth						Length		
					Horizontal field Meridian			Maximum					
Stimulus		Blue	Red	Green	Blue	Red	Green	Blue	Red	Green	Blue	Red	Green
Average	sq. cm.	15.11	17.99	22.58									
	cm.				3.36	3.68	4.22	3.62	3.96	4.49	5.18	5.60	6.35
	degrees				5.81	6.36	7.29	6.26	6.98	7.75	8.75	9.63	10.88
Range	sq. cm.	7.6–25.8	9.1–29.6	11.4–43.6									
	cm.				1.1–5.4	1.1–5.7	2.4–7.1	2.6–5.4	2.9–5.7	3.1–7.1	3.8–7.6	4.2–7.5	4.5–8.8
	degrees				1.9–9.3	1.9–9.8	4.2–12.2	4.5–9.3	5.0–9.8	5.3–12.2	6.6–13.0	7.3–12.9	7.8–14.9
Mean Deviation	sq. cm.	2.4	3.2	4.1									
	cm.				0.45	0.50	0.55	0.32	0.36	0.46	0.47	0.53	0.62
	degrees				0.77	0.86	0.95	0.55	0.61	0.79	0.81	0.91	1.08
Maximum Deviation	sq. cm.	9.7	12.0	14.6									
	cm.				2.4	2.6	2.9	1.8	1.7	2.6	2.4	1.9	2.4
	degrees				4.2	4.5	5.2	3.1	2.9	4.5	4.2	3.3	4.2
Increase in size as compared with Form Blind Spot	sq. cm.	3.71	6.59	11.18									
	percent	3%	58%	98%									

tion with Ferree and Rand in 1925 and 1930, are the only ones in which actual measurements of the areas of the blind spots have been made and in which the variable factors influencing the determination were studied and sufficiently controlled and standardized to give reliable and comparable results. The blind spots for red, blue, and green stimuli 1/2° in diameter at a distance of 33 cm. were found to vary in size according to the conditions under which the results were obtained. In all cases, however, the blind spot for colored stimuli was larger than that for form, the amount of difference varying according to the relative brightness of the background used. On gray of the same brightness as the color, they were 40-45 percent larger; on a black background, 47-71 percent larger and on a white background 72-132 percent larger. On gray and black backgrounds the order of ranking as to size was from largest to smallest green, red, blue, form; on white, green, blue, red, form.

The blind spot for color, like the color fields, is more sensitive to pathologic changes and shows an effect earlier in the course of the disease than does that for form. As in all testing instruments, however, this increased sensitivity is accompanied by an increase in the number of variable factors which may influence the results and also in the extent to which these factors are effective. Without a rigid control and standardization of these variable factors, therefore, erratic and confusing results are to be expected. This is well borne out by the statement of Berens to the effect that, while it is now generally conceded that a relative scotoma for white and colors surrounds the absolute blind spot, "the use of the colored test objects for outlining the blind spot has given such varying results, particularly when the illumination is not constant that it is not used as a part of clinic routine".

While complete knowledge of the variable factors which influence the size and shape of the blind spot for color is still in process of being obtained the possible factors, control and standardization of which have been found to give a satisfactory precision and reproducibility of result for repeated examinations of any given non-

pathologic eye, are very similar to those which have been found to influence the determination of the color fields and may be stated as follows: (1) Factors which may cause variation in a given eye; wave-length and purity of stimulus, intensity of stimulus, size or visual angle of stimulus, length of exposure of eye, method of exposure (moving or stationary object), method of approach (from blind to seeing area or vice versa), intensity of general illumination of the retina and its state of adaptation, breadth of pupil and brightness of preexposure and of background or surrounding field. (2) Factors which may cause variation from eye to eye or from person to person; age, curvature of cornea, errors of refraction both central and peripheral, acuity of peripheral field, breadth of pupil, sensitivity of the retina and distribution of this sensitivity over the retina.

In the first paper of this series, data were presented showing the range of variation of the form blind spot for 200 non-pathologic eyes when a white stimulus subtending a visual angle of one degree was used, and the illumination was kept constant at 7 foot-candles. A careful control was exercised over all of the external factors affecting the results of the determinations. The factors which influence the results from person to person, however, were left entirely to chance, not only because definite knowledge is lacking as to their relative importance but also in order that the results might be comparable to those obtained in general practice. The range of ages in the group of observers used was from 14 to 55 years.

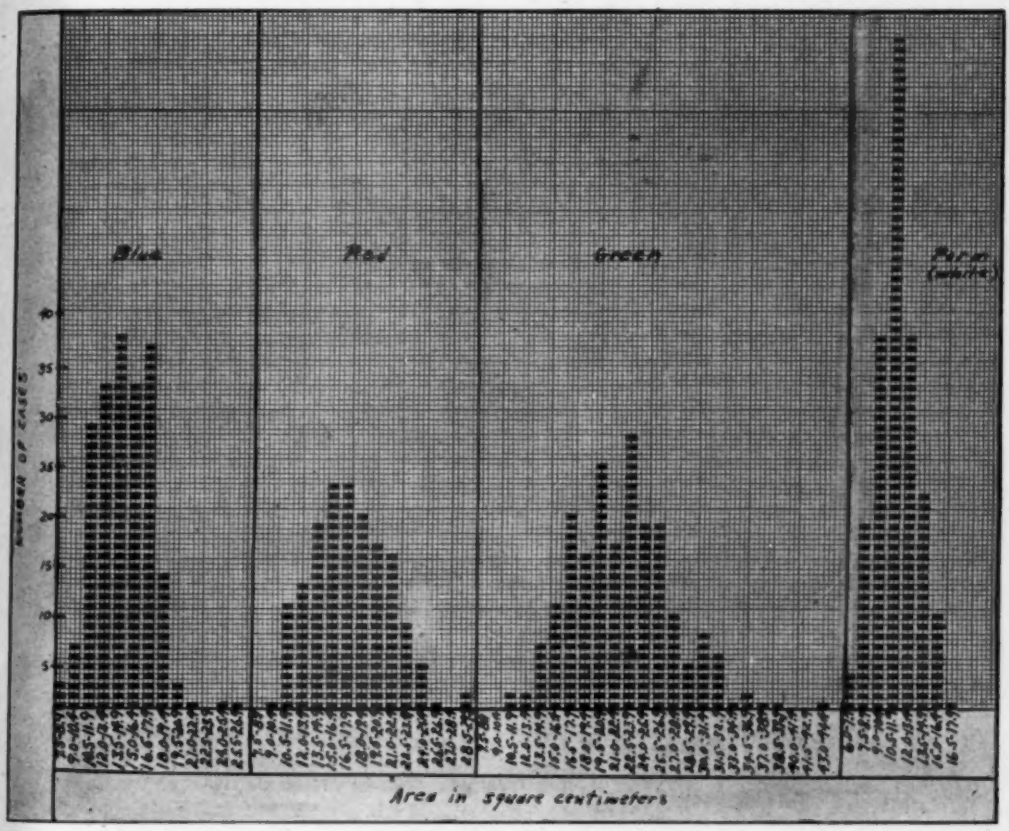


Fig. 1 (Wentworth). Area of blind spots for blue, red, green; and form stimuli; showing the distribution for 200 non-pathologic eyes.

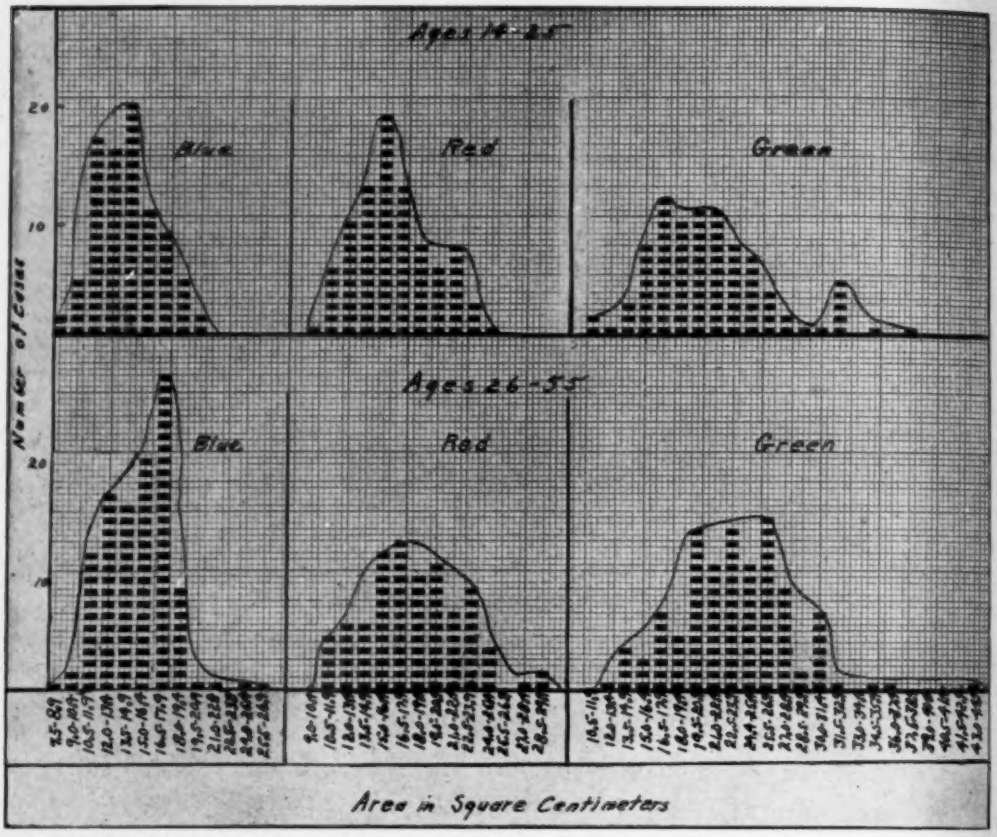


Fig. 2 (Wentworth). Area of blind spot for blue, red, and green stimuli; showing the distribution for (a) 88 eyes of persons 25 years of age or under and (b) 108 eyes of persons over 25 years of age.

The actual areas of the blind spots were measured by means of a planimeter. This is the most truly representative, accurate, and in case of the blind spot, the most easily obtained index for comparison from person to person. The results obtained were plotted in the form of a graph, showing the frequency distribution of cases around a mid or median value. From an inspection of the graphs the largest, smallest, and average blind spot for the entire group of observers or for special groups selected as to age, refraction, and so forth can be determined, as well as the size of blind spot that should be regarded as borderline or suspicious.

In the present study the same type of determination was made for the color blind spots as was made in the previous study for the form blind spot, using the same observers.

Conditions under which the work was done. The determinations were made on the campimeter attachment of the Ferree-Rand perimeter. The test objects employed consisted of discs of the standard red, green, and blue of the Heidelberg series of pigment papers, mounted on slender black rods. The discs were 5.8 mm. in diameter which subtends a visual angle of one degree at 33 cm., the distance of the screen from the eye. The intensity of illumination was kept constant at 7 foot-candles. Fixation was controlled by means of the parallax device provided with the perimeter. While the perimeter is provided also with tangent screens of grays of approximately the same brightness as the stimulus colors,

the black screen alone was used throughout the test. This was done with full recognition of the fact (since the experimental work on the blind spot in proof of it was done by the writer) that a background of the same brightness as the stimulus color is an important factor in obtaining reproducible and precise results. There are two reasons for this. It eliminates the variable effect due to brightness after image and brightness induction from the background or surrounding field on the power of the retina to respond to color and renders judgment easier since at the limits of sensitivity the stimulus becomes indistinguishable from the background. It has been found, however, in the course of several thousand perimetric examinations that for normal eyes the blind spot for color, at least for red, shows comparatively little variation when determined on screens either of black or of gray of the brightness of the color. In pathological conditions, on the other hand, a diminished sensitivity to red is frequently evidenced on a black screen through a change of hue to yellow or white far in advance of any detectable change on a screen of gray of the same brightness as the color. In other words, a brightness induction from the surrounding field which is somewhat unfavorable to the discrimination of color increases the effect due to a pathologic condition enough to lower the retinal sensitivity below the color threshold with a corresponding change in hue, where either condition acting separately would not be sufficient to effect a noticeable change. Moreover, a change in hue, such as occurs when the black screen is used, attracts the attention of the patient where corresponding variations in saturation which presumably occur

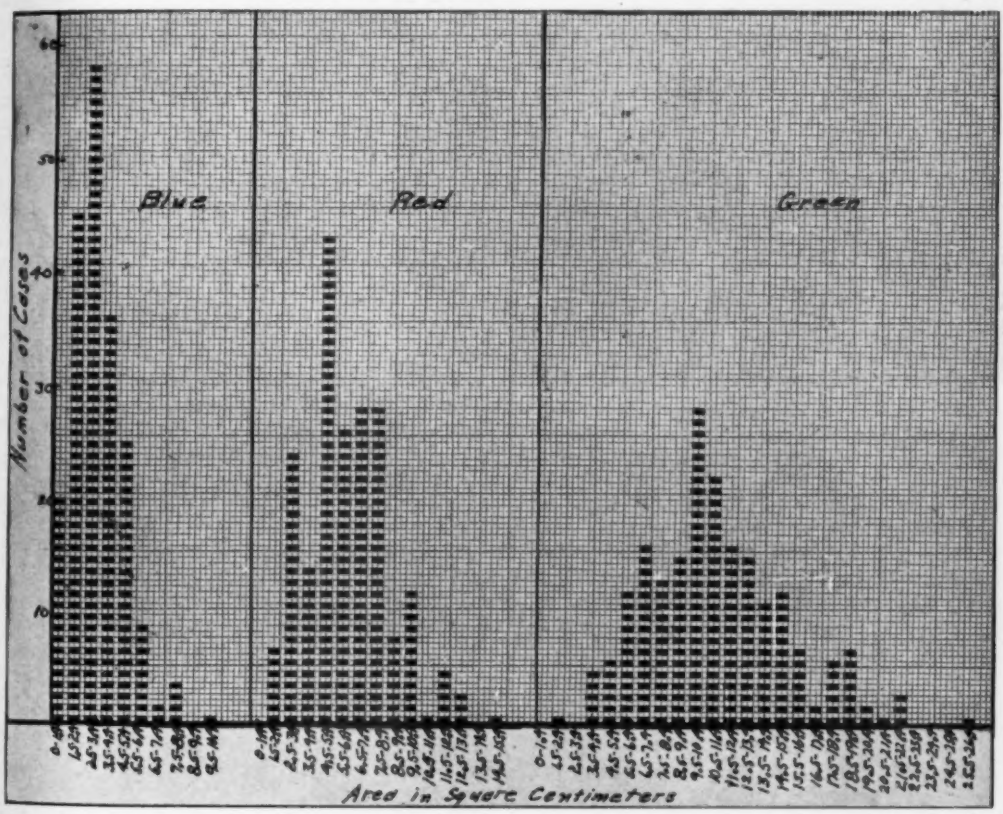


Fig. 3 (Wentworth). Area of color blind zone for blue, red, and green stimuli about the form blind spot; showing the distribution for 200 non-pathologic eyes.

on a background of a gray of the same brightness as the color, pass unremarked. In case of the blue stimulus the use of a black background rather than one of the brightness of the color is of uncertain value and for a green

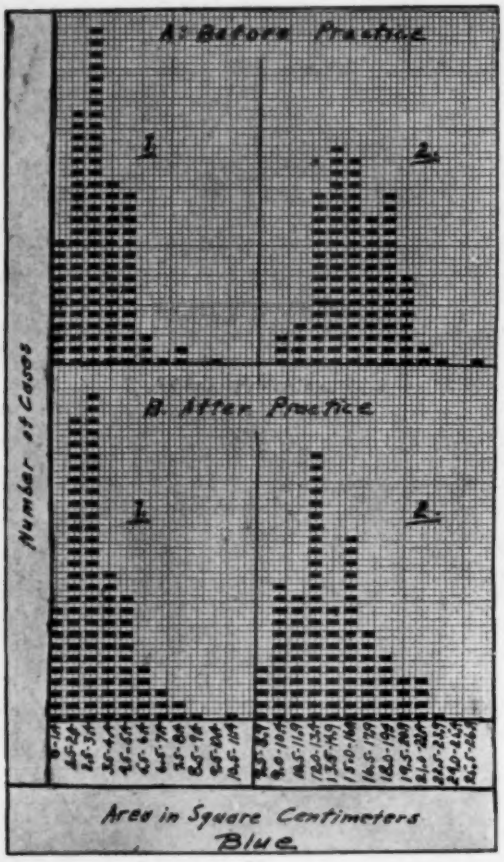


Fig. 4 (Wentworth). Area of blind spot for blue stimulus: (1) Area blind to color but not to form, (2) Entire blind area; showing the distribution for 100 non-pathologic eyes (a) for an untrained observer, and (b) after practice.

stimulus would appear definitely detrimental for diagnostic testing. The use of blue and green, however, as an early test for the majority of pathologic conditions for which the perimetric examination has been found of value, that is, those affecting the nerve fibers and conducting pathways, is of relatively less importance as compared to that of red, since the recognition of green is in any case too confusing and variable a test to be of much service and little change is effected in the retinal sensitivity to blue until a chorioretinal change has been induced. While external conditions of testing which are unfavorable to the retina's power to discriminate color will tend to increase the response to pathologic conditions, they will tend also to increase the range of normal variation. It is still a moot question, therefore, whether the increased response to pathologic changes under these conditions will be sufficiently great, even for red stimuli, to avoid a loss in sensitivity of the test due to an increase in the amount of overlapping of the normal and pathologic groups. The writer hopes in the future to present data bearing upon this point. For the present, those conditions of experimentation have been selected which seemed to be of most immediate service in practical perimetry. A further important consideration to those practicing perimetry, though of no consequence where any question of diminishing or increasing the value of the test is concerned, is the saving of time in routine examinations by the use of a single background or screen for all colors, with supplementary screens for use only in special cases, and the fact that at present a black screen is more generally available in clinics and offices.

The method of determining the blind spot limits was the same as that selected for determining the form blind spot. The test object was moved outward from the center of the blind spot until just recognized. This was done in a sufficient number of radial directions to insure an accurate outline. Frequent rest periods were allowed and each determination was carefully checked. No preliminary training was given, however, in order that the conditions of the test might approximate those which generally obtain in ordinary office and clinic practice. No cases were included which showed any evidence of a pathologic condition by objective examination.

Results: The results are given in detail in tables 1 to 3, and are shown

graphically in figures 1 to 12. The areas of the blind spots for blue, red, and green stimuli respectively are given in table 1, the averages and range of values in table 2. In table 3 the average breadth of the zones blind to color which surround the absolute blind spot is given for each of the chromatic stimuli used and a comparison made of the breadth of this zone in each case at the nasal, temporal, upper and lower borders of the blind spot.

The areas were measured by means of a planimeter and represent the size of the blind spot when determined on a black background at a distance of 33 cm. from the eye. A graphic representation of these areas and their distribu-

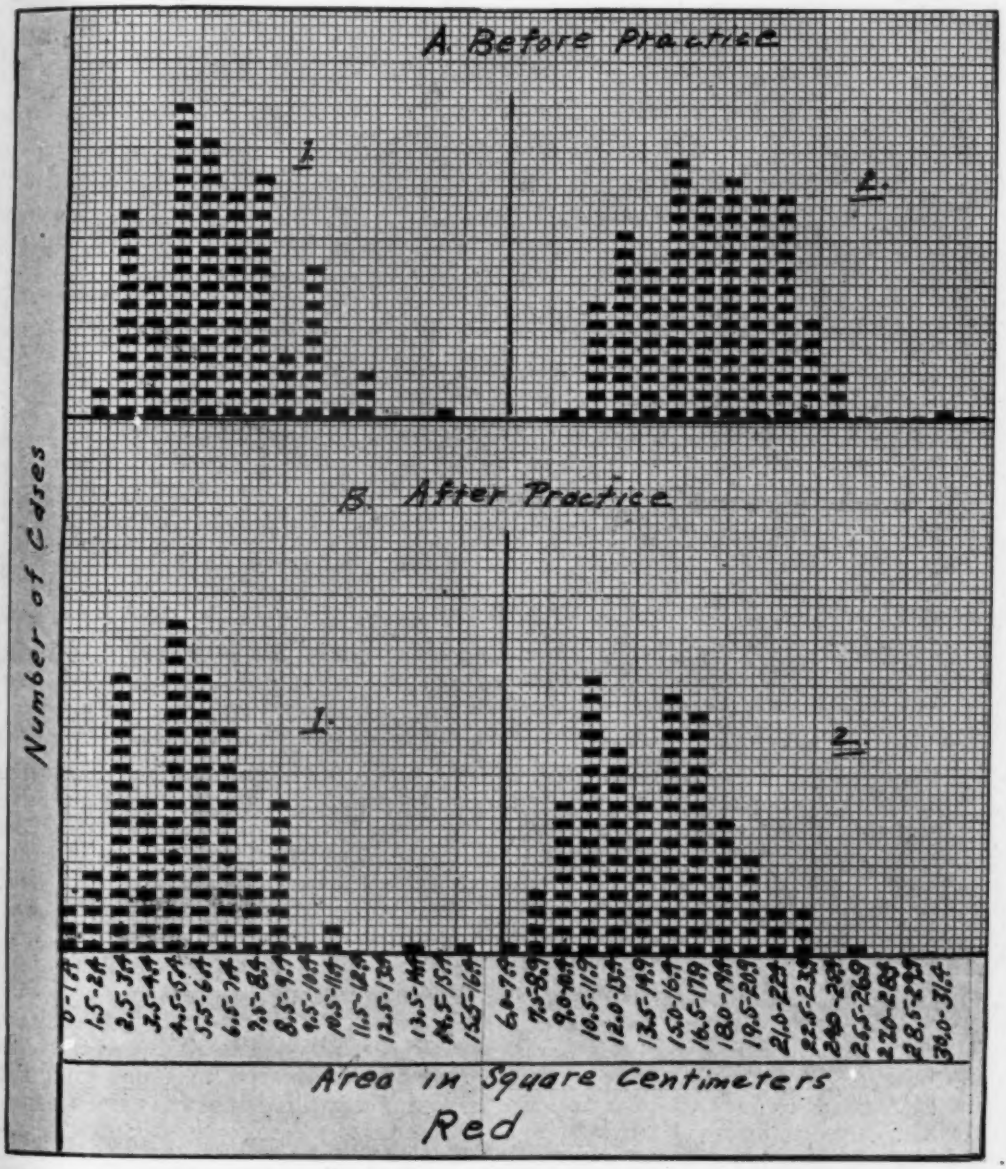


Fig. 5 (Wentworth). Area of blind spot for red stimulus: (1) Area blind to color but not to form, (2) Entire blind area; showing the distribution for 100 non-pathologic eyes (a) for an untrained observer, and (b) after practice.

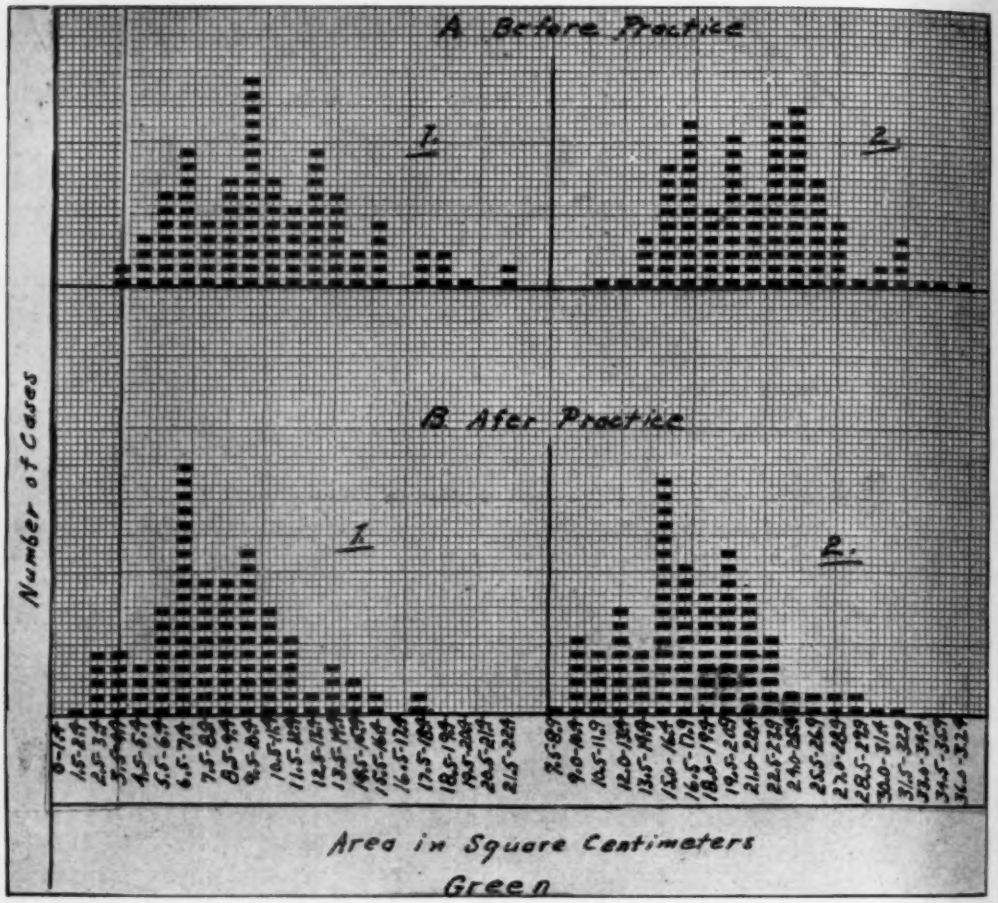


Fig. 6 (Wentworth). Area of blind spot for green stimulus: (1) Area blind to color but not to form, (2) Entire blind area; showing the distribution for 100 non-pathologic eyes (a) for an untrained observer, and (b) after practice.

tion is given in figure 1. For the value of comparison the distribution for the form blind spot has also been included. In plotting, the range of sizes of the blind spot for the 200 eyes examined has been divided into groups each of which covers a range of 1.5 sq. cm. The number of cases in each group is represented on the vertical coordinate, the range in size on the horizontal coordinate.

Separate distributions are given in figure 2 for persons 25 years of age or under and those over 25 years of age respectively. In figure 3 the distribution for the area blind to color but not to form has been given for 200 eyes. In figures 4 to 6 the distributions are given for 100 blind spots showing the effect of practice (1) on the entire area of the color blind spot and including the form blind spot, (2) on the area blind to color alone. In figures 7 to 9 the blind spots for blue, red, and green stimuli have been plotted to show the area of the smallest, largest, and average size of blind spot for 200 non-pathologic eyes and that size of blind spot considered borderline or suspicious in each case. In figures 10 to 12, the relative sizes of the color blind spots as compared to each other and to the form blind spot have been shown for the smallest, largest and average sizes obtained.

The results may be summarized as follows:

1. The average size of the blind spot

as measured by the planimeter was 15.11 sq. cm. for a blue stimulus; 17.99 sq. cm. for a red stimulus; and 22.58 sq. cm. for a green stimulus. This is an increase in area over that of the average form blind spot of 33 percent, 58 percent, and 98 percent, respectively.

2. The range of variation for the color blind spots was somewhat larger than for the form blind spot. The limiting values, and the range both in square centimeters and in percent of the average area of the group in question are as follows:

		Limiting Values Sq. cm.	Extent* Sq. cm.	Extent* Percent
Total Range	Blue	7.6—25.8	18.2	121
	Red	9.1—29.6	20.5	114
	Green	11.4—43.6	32.2	142
	Form	6.8—17.5	10.7	94
Middle 90%	Blue	10.6—19.0	9.6	64
	Red	11.4—23.6	12.2	68
	Green	14.8—30.8	16.0	71
	Form	8.0—14.4	6.8	60
Middle 50%	Blue	12.5—17.1	4.6	30
	Red	14.8—20.1	5.3	29
	Green	19.0—24.7	5.7	25
	Form	9.9—12.5	2.6	23

* Difference between limiting values.

3. The mean variation in size of the blind spot for the blue, red, and green stimuli was 2.41, 3.18, and 4.10 sq. cm., respectively, as compared to 1.6 sq. cm. for form. The maximum deviation was 9.7, 12.0, and 14.6 sq. cm. for blue, red, and green stimuli, respectively, as compared to 5.4 sq. cm. for form.

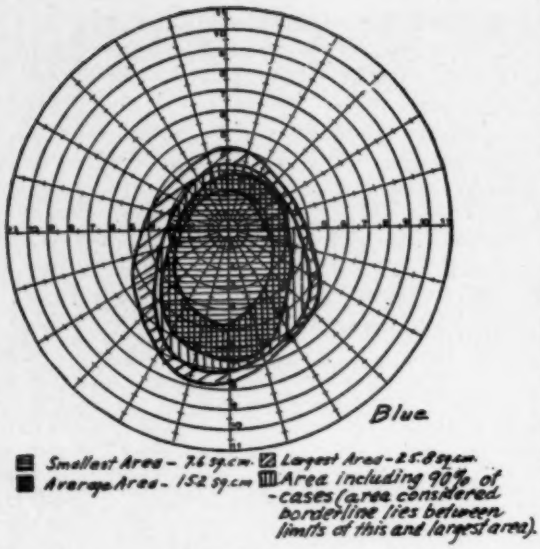
4. The average extent of the zone blind to color beyond the form blind spot was 0.41 degrees for blue, 0.74 degrees for red, and 1.28 degrees for green stimuli, respectively. This zone was narrowest and showed the least variation from person to person at the nasal border of the blind spot. Its diameter increased through the upper and temporal borders and reached a maximum value at the lower border where there was also a maximum variability from person to person. The average values at the nasal, temporal, upper and lower borders are given in table 3.

5. The greatest average breadth of the color blind spot was 6.26, 6.98, and 7.75 degrees for the blue, red, and green stimuli, respectively. The range of values for each of the colors was 4.5 to 9.3 degrees for blue, 5.0 to 9.8 degrees for red and 5.3 to 12.2 degrees for green. The mean deviation was, respectively, 0.55, 0.61, and 0.79 degrees. The average breadth in the horizontal meridian of the field was 5.81, 6.36, and

Table 3

BREADTH OF ZONE OF RELATIVE COLOR BLINDNESS ABOUT ABSOLUTE BLIND SPOT IN 200 NON-PATHOLOGIC EYES

Stimulus	Blue		Red		Green	
	mm.	degrees	mm.	degrees	mm.	degrees
Nasal Border	1.66	0.29	2.88	0.50	5.06	0.87
Upper Border	2.27	0.39	4.31	0.74	7.71	1.33
Temporal Border	2.37	0.41	4.49	0.77	7.57	1.31
Lower Border	3.12	0.54	5.39	0.93	9.39	1.62
Average	2.35	0.41	4.27	0.74	7.43	1.28



(Reduced one-half)

Fig. 7 (Wentworth). Area of blind spot for a blue stimulus, showing the smallest size of blind spot for 200 non-pathologic cases, the average size, the largest size, and that size of blind spot which may be regarded as border line.

7.29 degrees for the blue, red, and green stimuli, respectively. The range in each case in the order named was 1.9 to 9.3 degrees, 1.9 to 9.8 degrees, and 4.2 to 12.2 degrees; the mean deviation 0.77, 0.86, and 0.95 degrees.

6. The average length of the vertical axes of the color blind spots were for blue, 8.75 degrees, for red, 9.63 degrees, and for green 10.88 degrees; the respective range of values 3.8 to 7.6 degrees, 4.2 to 7.5 degrees, and 4.5 to 8.8 degrees; the mean deviation 0.81, 0.91, and 1.08 degrees.

7. As in the case of the form blind spot the average size of the color blind spot was found to increase somewhat with age. A survey of the distribution curves in figure 2, shows the greatest shift in the distribution toward the larger values for the blue stimulus, the least for the red. The average size of the blind spot for 88 eyes of persons 25 years of age or under was 13.8, 16.6, and 21.4 sq. cm. for the blue, red, and green stimuli, respectively, as compared to an average size of 15.2, 18.4, and 22.8 sq. cm., for 108 eyes of persons over 25 years of age.

8. As in case of the form blind spot, also, there is an observable decrease in the average size of the blind spot as a result of practice. In 100 of the eyes examined, the practice effect was determined in connection with another problem. The original series was determined on the tangent slate of the Ferree-Rand Perimeter, the series after practice on the Holloway-Cowan screen. The intensity of illumination, size and color test object and distance of the eye from the screen were the same for each case. The fixation control was slightly less rigid, however, in the second series of determinations. The device used consisted simply of a black dot within a black circle on a white disc approximately 1.5 degrees in diameter. In the original series the parallax device of the Ferree-Rand Perimeter was employed. Practice consisted of 16 determinations of the form and color blind spots at various distances of the eye from the screen. The

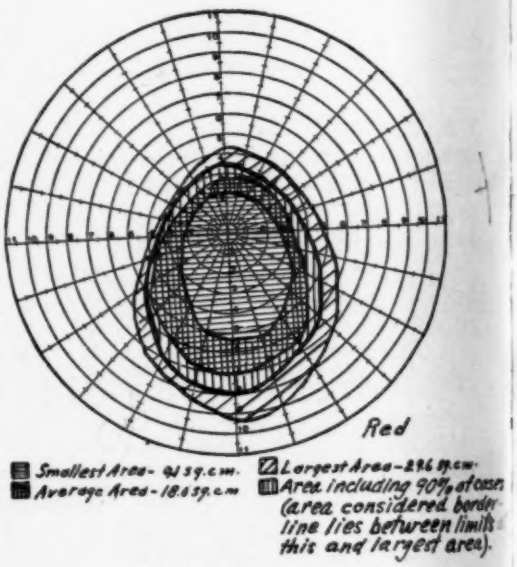


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Fig. 8 (Wentworth). Area of blind spot for a red stimulus, showing the smallest size of blind spot for 200 non-pathologic cases, the average size, the largest size, and that size of blind spot which may be regarded as borderline.

average area in square centimeters of the blind spots for 100 eyes before and after practice was as follows:

Stimulus	Blue	Red	Green
Before Practice.....	14.47	17.43	21.59
After Practice.....	12.55	13.82	17.99
Difference	1.92	3.61	3.60
Percentage decrease..	13%	20%	17%

The relative size of the area blind to color but not to form, however, remained unchanged with practice in case of the blue stimulus. For red and green stimuli on the other hand, the percentage change of the area blind only to color was approximately the same as for the entire color blind spot. From a survey of the distributions in each case, shown in figures 3 to 6, the form of the distribution curve appears to remain somewhat more stable for blue and red stimuli when the area blind only to color is measured. There is apparently little choice in case of the blind spot for a green stimulus. The value for diagnosis of a distribution based on the area blind to color but not to form rather than the entire size of the color blind spot including the absolute blind area is not entirely clear at this time. If, however, as seems certain, the blind spot for color changes in the presence of pathologic lesions in advance of the form blind spot, the difference in size between the color and form blind spots should be a more sensitive index of pathologic changes than the actual size of the color blind spot which includes the area blind not only to color but to form. That is, the earliest and greatest amount of change occurs chiefly within that small region blind to color alone which surrounds the form blind spot. Obviously the amount of variation is relatively greater and therefore more easily noted the smaller the area taken as the basis of comparison. The inclusion therefore, of the area blind to form with the color blind area tends to mask the variations which occur only in the latter. With this thought in mind both distributions have been given to serve as points of departure for further study as to the most serviceable form for diagnosis.

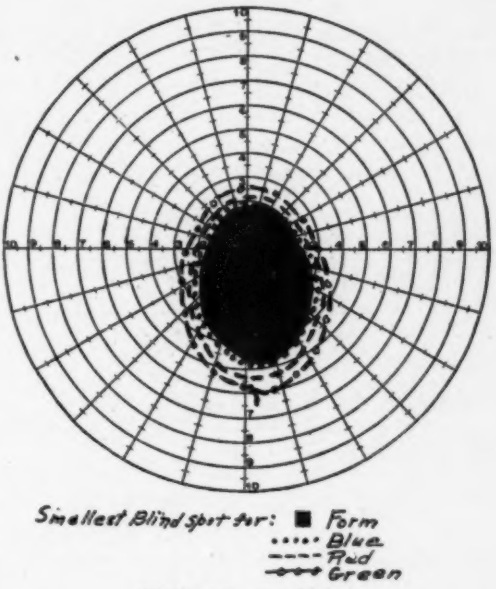

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Fig. 10 (Wentworth). Area of blind spot for form, blue, red, and green stimuli; showing the relative areas for the smallest size of blind spot for 200 non-pathologic cases.

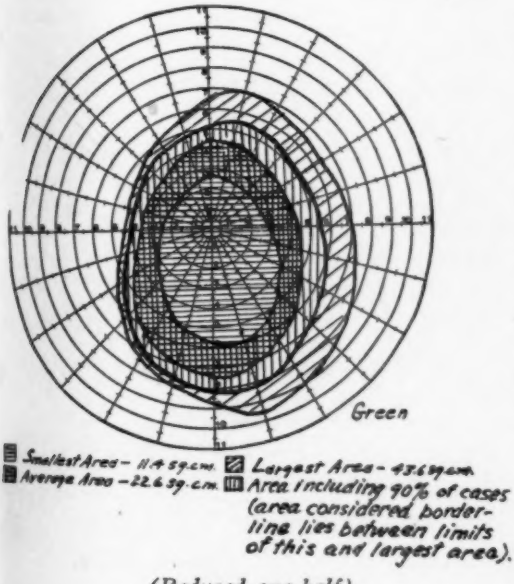

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Fig. 9 (Wentworth). Area of blind spot for a green stimulus, showing the smallest size of blind spot for 200 non-pathologic cases, the average size, the largest size, and that size of blind spot which may be regarded as borderline.

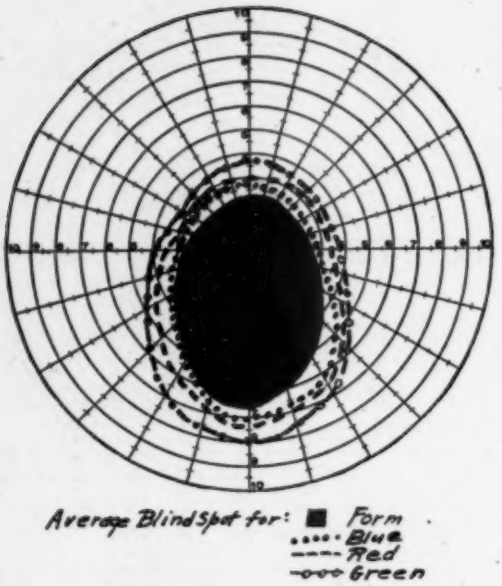

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Fig. 11 (Wentworth). Area of blind spot for form, blue, red, and green stimuli; showing the relative areas for the average size of blind spot for 200 non-pathologic cases.

9. The distribution of cases is in general of the same type as was found for the form blind spot. That is, the results when plotted approximate roughly the normal or Gaussian frequency curve. The greater range and larger amount of scatter make it more difficult to determine the borderline between the pathologic and non-pathologic groups and to delimit that group considered as suspicious. Until further evidence is obtained in regard to the pathologic group, we may consider that an area over 19 sq. cm. for blue, over 23.5 sq. cm. for red, and over 31 sq. cm. for green should be held as doubtful or suspicious. The variations with age, also, while not sufficient to be diagnostic in any given case, should be considered where any doubt is entertained as to the character of the blind spot obtained, particularly in the case of the blind spot for blue.

The cases here presented while too small a number from which to draw any general conclusions, may be considered as a fair sample of the normal range of variation in the color blind spots to be expected from an average group of untrained observers under a given set of conditions which approximate those found in the clinic when all external conditions known to influence the results are carefully controlled. It is fairly evident from the results that the use of a green stimulus for diagnostic testing, at least on a black background is too erratic and uncertain to be of value. The values obtained are widely scattered and the observers report great difficulty in making the judgment since the color is so weakly saturated as to appear nearly white or yellow at the temporal edge of the blind spot. The diagnostic value of the blue and red stimuli under these conditions can be determined only after a similar study has been made of the blind spot areas obtained in pathologic conditions under the same external conditions of testing. There is a great deal yet to be done both in the study of the factors which influence the size of the blind spot for non-pathologic

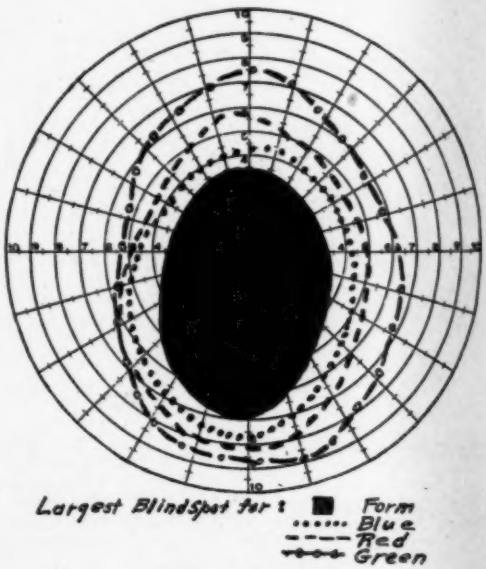

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Fig. 12 (Wentworth). Area of blind spot for form, blue, red, and green stimuli; showing the relative areas for the largest size of blind spot for 200 non-pathologic cases.

eyes and in the effect of pathologic changes upon the determination of the color blind spot under various conditions of testing before a maximum serviceability of the test for diagnosis can be obtained. We have presented these cases, therefore, with the hope that they may add somewhat to the knowledge of the color blind spot in normal eyes and may serve as a tentative scale or standard of comparison until further studies can be made.

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ELEMENTS OF SAFETY IN CATARACT EXTRACTION

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For maximum safety in cataract operations the patient should be studied carefully both as to the eye and the general condition. The state of retina, vitreous, and lens should be known. Biomicroscopic study of the lens helps to determine type of operation. The field of operation should be made as sterile as possible. Akinesia of orbital muscles and complete anesthesia of the globe are most important safety measures. A conjunctival flap is recommended with wound sutures. Many other measures of lesser importance are mentioned in detail. From the Department of Ophthalmology, State University of Iowa. Read before the Baltimore Ophthalmological Society, February 12, 1931.

The average ophthalmic surgeon approaches cataract extraction with a certain fear and trembling. It is naturally the desire of all surgeons to obtain good results, however it often seems to be only a desire and the necessary steps to effect such a result are frequently neglected. Of course, the entire blame for a bad result may rest with an unruly patient but, even in such a case, there are procedures which may be employed to lessen the risk of a ruined eye. The method of extraction must be chosen by each surgeon according to his experience, but there are many refinements which each and every one may utilize to insure, in so far as is possible, a good result.

Measures which, to a certain degree, lead to a good result, begin with the history, general examination, and preparation of the patient for operation, and extend on through the entire period of hospitalization.

History. The history is important in that it may suggest certain hereditary diseases of the eye other than cataract, sudden or gradual loss of vision before the appearance of the cataract, diabetes, tetany, or other complicating pathologic processes.

Examination. Every patient who enters the hospital for a cataract extraction should have a thorough ocular examination. The state of the conjunctiva and lacrimal sac may play a determining rôle in the eventual result. It does not seem that simple inspection of the conjunctiva, followed by the decision that it is clinically normal, is sufficient guarantee that it does not harbor pathogenic microörganisms which may set up an intra-ocular inflammation, once they gain access to the interior of the eye. A more sure and refined method is to culture the flora of the conjunctiva for at least three days on blood agar or some equally good medium. Apparently all organisms are not pathogenic for the eye, since good results are consistently obtained even though the cultures show a few colonies of xerosis bacillus, Hoffman's bacillus, or staphylococcus albus. One should not operate if the cultures show such organisms as staphylococcus aureus, pneumococcus, streptococcus, or others of equal virulence; operative interference should be deferred until the culture is sterile or shows only nonpathogenic microörganisms. It is quite impossible to sterilize the conjunctiva but care may be taken to render it practically sterile by instillations of such slightly irritating antiseptics as 25 percent argyrol, 5 percent protargol, or 2 percent mercurochrome for a few days prior to operation. Silver nitrate is not often necessary and should not be used unless an acute conjunctivitis is present, then it is better to delay the operation until the conjunctiva is again normal.

The lacrimal passages from the eye to the nose should be patulous and free from infection. An operation is never made in the presence of stenosis below the canaliculus or known infection of the lacrimal sac but occasionally errors of omission may creep in, and failure to note the contents of a sac may be the cause of a lost eye. In order to preclude any effect from regurgitation of pathogenic organisms, which may be present in the sac, it is a routine measure at the University of Iowa to irrigate the lacrimal passages and instill daily, prior to

operation, a few drops of 2 percent mercurochrome through the lower puncta. In this way an attempt is made to reduce the number of microörganisms, even in a clinically normal sac. Of course, if the sac is infected it is removed and the patient waits a few weeks until the conjunctiva is normal again and in condition for operation.

The intra-ocular tension is determined by palpation through the lids; if any doubt exists, tonometric tensions are taken. In cases with high tension, sudden opening of the globe may result in expulsive hemorrhage, consequently the tension is to be reduced before making an extraction.

Slit-lamp studies of the lens should be made, if possible through a dilated pupil. A combination of cocain and euphthalmin dilates the ordinary pupil well and yet is controllable with eserine, should any increase in tension take place. If the pupil does not dilate well this is probably due to the presence of iris synechiae or degeneration of the sphincter muscle, and one knows then that a complete iridectomy is indicated at the time of extraction, as explained below. The cataract is studied with the slit-lamp microscope and one should note whether the lens changes are of the senile type or of the type which occurs secondarily to other diseases; i.e., cataracta complicata. If a senile cataract is present, it is necessary to know the stage of maturity, in order to plan the method of extraction and to anticipate possible complications during the operation.

Incipient and mature cataracts may be removed by the intracapsular method, but a swollen lens in the intumescent stage is ordinarily a poor subject for anything except the extracapsular method. The tense capsule of the swollen intumescent cataractous lens almost invariably ruptures when grasped with the capsule forceps. By minute study of the eye, and especially, the lens, the type of extraction is determined. If the lens is one for intracapsular extraction the incision should be slightly larger and a good conjunctival flap is especially desirable. If the cataract is hypermature the type of operation depends upon the size of the nucleus and the condition of the suspensory ligament. With a large sclerosed nucleus one should make a large incision and extract by the extracapsular method; with a Morgagnian cataract or cataracta lactea the incision should be very short and extraction by the extracapsular method. A complete study of the lens is necessary if one would do well by the patient.

Also at the same study the possibility of other ocular pathology should be determined. Iris atrophy, cyclitic deposits on the posterior corneal surface, synechiae and other findings, indicative of pathologic ocular changes, help us to anticipate the presence of fluid vitreous, a degenerated zonule or other conditions which complicate extraction, and which affect the prognosis and method of extraction.

The vision of the patient is given careful consideration, since it is extremely unpleasant to do an operation and find, to our chagrin, that some fundus disease makes the work all for naught. Cataract occurs as a complication in many diseases of the posterior segment and one should be as sure as possible that no glaucoma, uveitis, optic atrophy, detachment of the retina, retinitis pigmentosa, or grave chorioretinal disorder exists. The state of vision in the peripheral retina may be roughly estimated by the usual test with two small lights, one of which the patient observes while the other is moved in from the periphery. Even more important is the state of central vision. This is ordinarily determined by estimating the distance to which two small lights of equal intensity must be separated before the patient senses .two stimuli. Most patients with a mature cataract and a normal retina can distinguish ordinary ophthalmoscopic lights, held at one meter distance, after the separation reaches 10 to 15 centimeters.

The general examination should bring out any pathologic condition which may have a bearing on the ultimate outcome of the cataract extraction. In patients with uncompensated cardiac disease, asthma, bronchiectasis or other diseases

associated with difficult breathing, coughing, and the like, it is necessary to employ special methods of control. Blood chemistry frequently reveals an undiagnosed diabetes which should be treated before making an operation, or the discovery of low blood calcium may lead to a diagnosis of hypoparathyroidism. In the latter disease it is necessary to place the patient on a special routine in order to prevent postoperative complications. High blood pressure, especially high diastolic pressure, such as occurs in essential hypertension, may give rise to intraocular hemorrhage; the pressure should be temporarily reduced prior to operation.

Preliminary preparation for operation. In addition to the preparation of the conjunctiva and lacrimal passages, as mentioned above, certain general measures are carried out. A daily nasal spray of 1 percent ephedrin in oil is used to promote drainage from the sinuses. One ounce of liquid petrolatum is administered daily in order to relieve the intestinal tract; in addition to this, a soap-suds enema is given in the afternoon of the day prior to operation and repeated early the following morning. One hour before operation the patient receives 20 grains of sodium bromide and 10 grains of chloral per rectum.

Preliminary training of patient. It does not seem necessary to prepare the patient for operation by a preliminary rehearsal of the actions which are expected of him at the time of the extraction. If complete akinesia and anesthesia are present at the time of operation, and a superior rectus fixation suture is employed, one need have little fear of any complications from ordinary bad behavior. I have always felt that preliminary training only serves to increase the magnitude of the operation in the mind of the patient, and to increase worry.

Preliminary iridectomy. It is my belief that preliminary iridectomy does not increase the safety of cataract extraction but rather decreases it. There are no logical reasons for this procedure in ordinary senile cataract. The usual excuse for preliminary iridectomy is that it serves to teach the patient what to expect at the later operation and has the effect of quieting nervousness; it is expected that his behavior will be better when the more dangerous operation is performed. I have no doubt this is true, but it seems unnecessary if the eye is completely anesthetized and the lids are paralyzed during cataract extraction. There are several objections to preliminary iridectomy however, among which may be mentioned the impossibility of obtaining a conjunctival flap at the subsequent extraction, the opening of an eye twice instead of once, and a lesser reason, the longer hospitalization.

The pupil. In uncomplicated cases the pupil should always be dilated with a weak mydriatic. Homatropine (2 percent) one hour before operation, assisted by the mydriatic action of the cocain used as an anesthetic, places the pupil in an optimum state of dilatation. The pupil dilated in such a manner allows intracapsular extraction or, if extracapsular operation is preferred, it enables one to obtain a large bite of anterior capsule without interference from the iris. On the other hand, the pupil should not be dilated ad maximum since the iridotomy is more difficult, the vitreous has more of an opportunity to escape, and the iris may become incarcerated in the incision. In case the pupil will not dilate, an iridectomy or meridional iridotomy is made in order to allow proper delivery of the lens.

Akinesia. A large number of the poor results in cataract extraction are due to squeezing of the lids during operation. This complication often arises as a result of, and in combination with, poor anesthesia. Those surgeons who fail to employ akinesia of the orbicularis muscle are not giving themselves a fair chance. It was van Lint who first brought to the attention of ophthalmic surgeons the great good of this procedure. Others have modified his technique, among them myself, until now it is a simple matter to approach the operation knowing the patient cannot do himself damage by lid pressure. There is no case in which lid palsy should not be used as an added element of safety.

Anesthesia. I was surprised to hear one of the best-known ophthalmic surgeons in Europe say, when speaking on cataract extraction, that iridectomy is painful because generally anesthesia is incomplete. Incomplete anesthesia is productive of many poor results in cataract surgery. The iris is extremely sensitive and, unless special methods are used to anesthetize it, the iridectomy gives rise to pain which leads to fright, accompanied by squeezing of the lids if they are not paralyzed, eye and head movements, and other disagreeable consequences.

Absolute anesthesia may be obtained quickly and without difficulty by the following method: instillations of sterile 5 percent cocain solution into the conjunctival sac, every two minutes for five doses; one drop of 1-1000 adrenalin instilled one minute after each instillation of cocain; subconjunctival injection of a few drops of sterile 2 percent cocain solution above the upper limbus, after the second instillation of 5 percent cocain. Follow the last instillation of cocain with a retrobulbar injection of 1 cc. of sterile 2 percent procain solution. The subconjunctival injection of cocain is to be made just under the conjunctiva rather than into the episcleral tissue, otherwise hemorrhage may prove bothersome. This injection not only produces excellent iris anesthesia but also aids mechanically in securing a conjunctival flap during the section. In the retrobulbar injection a fine needle is entered in the inferior conjunctival fornix, between the lateral and inferior recti muscles, pushed backward toward the apex of the orbit for about 1 cm., the plunger of the syringe withdrawn to see that the needle has not entered a blood vessel, and the injection of procain made. The retrobulbar injection not only deepens the anesthesia but reduces intraocular tension and in this way assists in preventing vitreous prolapse. If anesthesia is administered in the above manner the patient has absolutely no sense of pain and, as the operation progresses, his confidence increases and his behavior is usually excellent.

Immediately following anesthesia the patient is draped, the conjunctival sac is irrigated, and the operation is begun, since cocain tends to gradually soften the cornea and, if this occurs, the operation is more difficult.

Irrigation of conjunctival sac. The conjunctival sac is thoroughly cleansed. Three or four drops of 25 percent argyrol, instilled prior to irrigation, discolors mucus and other foreign particles and enables one to determine easily when the conjunctiva is clean. Thorough irrigation with a mild antiseptic solution, such as 1-8000 mercurophen or 1-10,000 bichloride of mercury is an added element of safety.

Cilia. The lashes are clipped from the temporal third of the upper lid in order that the knife may not touch them and become contaminated. They are removed with greased scissors since, when cut in this manner, they do not fall onto the globe. The remaining lashes enable one to pull down the paralyzed upper lid following the operation.

Face cover. The region of the eye is covered with a piece of thin sterile gauze containing a small oval opening. This gauze is wet with 1-10,000 bichloride of mercury solution immediately before it is applied. A sterile towel with a larger opening is placed over this gauze.

Operation. Certainly one of the greatest elements of safety in cataract extraction exists in the surgical judgment and ability of the surgeon and his ability to anticipate and meet emergencies. This cannot be discussed because it is a part of the surgeon and may be improved only by study, observation, and experience. A trained assistant is a valuable adjunct, especially one who is acquainted with the methods of the operating surgeon.

All instruments should be known to be in perfect working order and within easy reach; they should be arranged in the order of their use, with certain instruments for emergency use in another location. This arrangement of instruments tends to shorten the time of operation, allows the surgeon to keep his eyes and mind on the operative field and

is, in consequence, a measure of safety.

Speculum. It seems that a speculum of the proper type is as safe as lid elevators. The speculum should be light in weight, and easy to remove in case any emergency necessitating this action arises. Often it is necessary to watch an assistant closely, lest he become interested in the operation itself and allow the speculum to press upon the globe. With complete lid palsy it is usually a simple matter to keep the lids away from the eyeball and thus avoid pressure. If the patient has a prominent eyeball and tight lids, the lateral canthal ligament may press inward on the globe when the speculum is lifted; in this case it is wise to do a simple canthotomy.

Fixation. Fixation of the globe must be good, otherwise the incision may be ragged or in the wrong place. Most fixation forceps have teeth of such a nature that they grasp only the conjunctiva at the limbus. In elderly patients the conjunctiva may be fragile and easily torn, and one may lose fixation. To prevent such a complication, the forceps should have fine teeth, of sufficient length and placed at such an angle that the superficial sclera is grasped. This is important and such forceps are difficult to obtain. After grasping the conjunctiva and superficial sclera at the limbus, no pressure is exerted toward the globe at any time thereafter or loss of vitreous may be precipitated.

Superior rectus fixation, with a silk suture passed through the tendon of the superior rectus muscle, is indicated in patients who do not give promise of complete control. This suture must pass through a small bit of conjunctiva and tendon, for, if a large area of conjunctiva is incorporated in the suture, it will be pulled over the incision and complicate extraction of the lens. The fixation suture should be placed before the incision is made and used only when necessary to rotate the cornea downward.

Incision. Of great importance is the incision by which the globe is opened. One is prepared by previous study of the eye and lens to make that type of incision which is safest and most suitable. If an intracapsular extraction is contemplated, the incision is slightly larger, since undue effort to extract the lens through too short an incision may result in complications. On the other hand, a soft hypermature or Morgagnian cataract may be removed by the extracapsular method through a small incision. One should be sure that the point and entire cutting edge of the knife are sharp. To ensure greatest safety, after the counter puncture, the incision is made rapidly and smoothly with the full knife, otherwise the iris may fall before the knife and a large ragged iridectomy be made. Too much sawing produces a ragged wound. The best incision is one which follows the limbus.

If the incision is placed in corneal tissue it may be too small for easy delivery of the lens; excess pressure in an attempt to deliver the lens may cause vitreous prolapse. Corneal incisions do not offer a good guarantee against infection, since the tissue is avascular, and furthermore the wound does not ordinarily heal as rapidly. Again, with a corneal incision, there is greater possibility of epithelial down growth into the anterior chamber and production of secondary glaucoma. Astigmatism is also higher following a corneal incision.

If the incision is too deep, and into the sclera, one encounters unnecessary bleeding; this blood may fill the anterior chamber and obliterate the field of operation. Also a deep incision is more likely to be accompanied by entanglement of the iris in the knife; furthermore such an incision is more often followed by iris prolapse and incarceration of this tissue in the wound.

A conjunctival flap, which may be sutured, is one of the greatest elements of safety in extraction. The flap should be made throughout the line of incision and is better if not too wide. Serum and the small amount of blood which accompanies such a flap assist, by causing rapid adhesion of the conjunctiva and episcleral tissues, in preventing the entrance of microörganisms into the wound. For the same reason the anterior chamber reforms rapidly, often within four to six hours after extraction, thus closing the wound to infection.

Wound sutures. Two to four fine silk sutures are placed and loosely tied. A fine corneal needle is best since it is easily passed through the flap without undue pulling on the globe. These sutures are left sufficiently loose to allow for delivery of the lens; they are pulled to one side where they may be grasped easily and tied quickly in case of threatened vitreous prolapse. Should blood seep into the anterior chamber during the tying of the sutures, it is irrigated out immediately, before it clots, with sterile hypotonic salt solution. If it is not removed, clots form and tenaciously cling to the iris, thus obscuring the field of operation and making it difficult to make the iridotomy, and even more difficult to grasp the lens capsule with the capsule forceps. With the sutures in the conjunctival flap one is more secure during the operation; the wound heals quickly and there is not so much danger of postoperative wound rupture in unruly patients. It is a great element of safety, especially in patients with cardiac disease, asthma, retention of urine, mental disturbances, and other complicating disorders.

Iridotomy or iridectomy. For the usual uncomplicated case, peripheral iridotomy or iridectomy is just as efficient in preventing iris prolapse as is complete iridectomy, and the cosmetic result is much better. If an iridotomy is performed there is not so much liability of incarceration of lens capsule in the wound. If the sphincter muscle of the iris has been relaxed, and the iridotomy is small and peripherally placed, there is practically no danger of iris rupture during extraction of the lens. In making the iridotomy the anterior flap of the wound is lifted with fine forceps and the iris is exposed to view, then, with sharp, pointed scissors, a small snip is made in the upper iris periphery. One must not go too deep with the point of the scissors, otherwise the anterior border layer of the vitreous may be opened and a vitreous prolapse may ensue.

Extraction. Intracapsular extraction, as advocated by Stanculeanu, Török, Elschnig, and others, by means of forceps combined with slight outside pressure, is an excellent method for extraction of cataracts in the stage of incipiency or maturity, for those surgeons who operate frequently. Also some hypermature cataracts may be safely extracted by this method. Intracapsular extraction, in uncomplicated cases, seems no more dangerous than the extracapsular method and it lessens the chances of iridocyclitis and after-cataract. In the hands of an experienced operator it is often the method of choice. A large bite of capsule is grasped at the lower pupillary margin and for a few seconds a rotary motion, with very little pull, is exerted. As soon as the lower zonule is ruptured and the lens is dislocated, pressure is applied at the lower limbus and exerted toward the center of the eyeball. During all this time the lens is being pulled gently forward and upward with the forceps. In the final stage of extraction the outside pressure is again transferred to the upper lip of the wound and the lens withdrawn from the eye.

Extracapsular extraction is less liable to be accompanied by complications in the hands of those surgeons who operate infrequently. The capsule forceps, rather than the cystotome, should always be used to rupture the capsule. The former instrument bites out a large piece of anterior capsule and epithelium, if the pupil is well dilated, and thus makes remote the chances of after-cataract formation. This is due to the removal of a large mass of epithelium and also to the fact that the aqueous gains access to the remaining lens fibers. With the cystotome the entire capsule and epithelium of the lens remain in the anterior chamber and, since the latter proliferates throughout life, a secondary operation is almost always necessary. If, with the capsule forceps, a large area of capsule and epithelium is removed and the anterior chamber is irrigated after extraction, a subsequent needling is not necessary in over 5 to 10 percent of cases. The Kalt forceps is preferable to a toothed forceps, since the former tears out a greater area of capsule than the latter. In order to obtain a large piece of capsule, the forceps opened as wide as

possible, is applied with moderate pressure to the anterior surface of the lens; a large bite is taken and a gentle rotary motion tears off a large area of capsule and epithelium. The pull is exerted toward the cornea and not toward the wound, otherwise the lens may be dislocated upward. One must be sure to keep the forceps closed until the capsule is removed from the eyeball.

Tying the sutures. The conjunctival sutures are tied immediately after delivery of the lens. Comparative safety is thus assured during the remaining steps of the operation and throughout the postoperative course. If only two knots are placed, the sutures usually fall out around the sixth to eighth day; if they don't they may be removed about the tenth day without danger of wound rupture.

Cortical remains. In the intracapsular operation it is not necessary to think of cortical remains. In the extracapsular extraction some cortex usually remains in the anterior and posterior chambers. This is removed by irrigation with sterile hypotonic salt solution. One may irrigate almost with impunity as long as the irrigating tip is kept parallel to the iris and as long as the stream is gentle. The irrigator must not dig into the vitreous or scrape the posterior surface of the cornea. It is my experience that irrigation is not a carrier of infection. It does remove a great part of the remaining cortex and in this way lowers the percentage of cases with postoperative iridocyclitis and after-cataract. Properly done capsulectomy and irrigation does away almost entirely with after-cataract. If the area of the wound is also irrigated, any bit of capsule is washed out of the wound, thus preventing secondary glaucoma which may arise from incarcerated capsule.

Toilet. In replacing the iris care must be exercised not to dig the spatula into the vitreous. The iris repositor should lie parallel to the surface of the iris at all times. It should touch neither the anterior surface of the vitreous nor the posterior surface of the cornea; if it does there may be a prolapse of vitreous on the one hand or a cloudy cornea on the other. Should the iris have a tendency to prolapse, a complete iridectomy is indicated.

Dressings. Eserin and White's ointments are placed in the lower conjunctival cul-de-sac. The former contracts the iris sphincter and has a tendency to prevent iris prolapse. In the rare cases in which a complete iridectomy is made, atropin is used instead of eserin. White's ointment assists in sterilization of the conjunctiva and wound area. The lashes are grasped and the upper lid pulled down, since the patient is unable to close the lid himself. A lightly greased, thin, oval dressing (3 x 5 cm.) is placed over the closed lids and on top of this a larger dressing. This assures complete closure of the lids, even when they are paralyzed. The opposite eye is dressed in a similar manner and the two dressings are fastened to the face by adhesive tape. A metal shield is placed over the operated eye to guard against accidents.

After treatment. The patient is placed in bed and instructed to remain as quiet as possible for a few days. If there is extreme restlessness, allonal may be prescribed. Morphine should never be administered since it may provoke vomiting. Liquid diet for three or four days has a tendency to lessen activity on the part of the intestinal tract.

After intracapsular extraction it is not necessary to dress the eye until the fourth or fifth day, since there is no cortex to which the irritated iris may become attached. After extracapsular extraction, however it is wise to instill atropin or scopolamin ointment at the end of 24 hours. The pupil should be kept widely dilated after this time in order that the aqueous may gain access to the remaining lens cortex and also to prevent adhesions of the iris to any remaining lens matter.

The unoperated eye may be left open with safety after two or three days, but the operated eye is dressed for one week. The protective shield is worn at night for three additional days.

Refraction. Refraction of an aphakic eye is not difficult but one must remember that test lenses must be ac-

curately placed before the eye during the refraction, and that the spectacle lenses are to be set in the same way and at the same distance, as the trial lenses, otherwise the patient does not obtain the greatest possible visual acuity.

Summary and Conclusions

Ophthalmic surgeons should pay attention to every detail which adds to the safety of cataract extraction. Not one of these added measures of safety is unimportant, if one would attain the best possible results.

The patient should be thoroughly studied prior to operation, not only the eye but also the general condition. It is especially necessary to know the state of the retina, vitreous, and lens in so far as is possible. Biomicroscopic studies of the lens assist in the determination of operative procedure.

The field of operation should be made as sterile as possible. The general condition of the patient should be such that no undue strain on the wound will occur during convalescence.

Among the most important measures which lend added safety to cataract extraction, no two are more outstanding than thorough akinesia of the orbicularis muscle and complete anesthesia of the globe. The former is secured by injection of the temporofacial branches of the seventh cranial nerve, and the latter by instillations of cocain into the conjunctival sac, augmented by the subconjunctival injection of cocain and the retrobulbar injection of procain.

Another considerable element of safety is a conjunctival flap which may be sutured. This provides greater control of the eye when complications arise during the operation, allows of more rapid healing of the wound, and secures greater safety from postoperative rupture.

In extracapsular extraction the use of capsule forceps and thorough irrigation of the anterior chamber with sterile hypotonic saline solution, followed by the use of atropin lessens greatly the number of secondary operations for after-cataract, and thus lessens the risk of multiple operations. In addition to the above mentioned measures, there are others of lesser import all of which should be taken into consideration and utilized in order to make cataract extraction a safe operation.

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HYPERPHORIA, ITS ETIOLOGY, DIAGNOSIS AND TREATMENT

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Vertical heterophorias are considered to be generally due to muscle paresis or paralysis, hence in most instances to be noncomitant. Careful measurement of the amount of hyperphoria present in the six cardinal directions is advocated to establish the paretic origin. The treatment is to be directed to relief of symptoms in most cases. Prisms are useful but should correct no more hyperphoria than is present in the lower field. Proper surgical treatment depends on accurate diagnosis as to the muscle involved. Read before the Eye, Ear, Nose, and Throat Section, Connecticut State Medical Society, Bridgeport, May 21, 1931.

While hyperphoria is much less common than the lateral heterophorias it occurs with sufficient frequency to demand our attention. Reber in an analysis of 3,600 cases found at least one degree of hyperphoria present in 7 percent, as did Bannister in his series of 100 healthy soldiers. Peter in 800 cases discovered a hyperphoria of one half degree or more in 33 percent of them, Carpenter found it present in 35 percent of his cases, Blair in 39 percent, Posey in 13 percent, Howe and Williams in 16 percent. In view of these statistics I believe we can safely say that a hyperphoria of at least one degree is present in about 7 percent of our patients.

It is also a well-known fact that a hyperphoria of small amount is more productive of asthenopia than a similar amount of lateral heterophoria. This is due to our very limited ability to overcome vertically displaced images in comparison to the ease with which we can fuse lateral displacements. As Stevens expresses it, "When we recall the fact that with a fair adducting power one may overcome prisms of 50°, with the bases at the temples and that with a good abducting ability a prism of 7° or 8° is easily overcome in the opposite direction, it will be apparent that muscles, which do not ordinarily overcome more than a prism of 3° as is the case when the prism is placed with its base up or down, must be in a condition of great disadvantage when hyperphoria of 1° or 2° exists." Hyperphoria occurring with such frequency and so productive of discomfort is therefore worthy of our most earnest consideration.

Etiology: Various theories have been expounded to explain the cause of hyperphoria, yet a study of these explanations leaves one in a quandary. Some have contended that abnormalities in the shape, size, or level of the orbits account for them, while others are just as positive that they are due to faulty insertions or mal-development of the muscles themselves; and still others feel that they are of nonparalytic origin being due to anomalies of the power of sursumvergence. The proof of the fallacy of the nonparalytic origin theory is that the ability to overcome vertically placed prisms is rarely over 3° and that attempts to improve this power by exercise are futile. The only cases of increased sursumverging power I have encountered have been in patients wearing poorly adjusted strong lenses where, due to this maladjustment they have been forced to overcome a considerable degree of vertically placed prism. These have occasionally shown a spurious hyperphoria which rapidly disappeared after correct refraction. There is also a type of hyperphoria which occurs rarely as a spasmodic affair which seems to be in some way connected with accommodation because the correction of the refractive error causes its disappearance. Most hyperphorias however, once developed, last indefinitely and tend to remain unchanged. I believe that the vast majority of hyperphorias are of paretic origin. The paresis may be almost complete and easily recognized or it may be extremely slight and difficult to detect. While most authorities are willing to admit that hyperphorias of high degree are largely due to an involvement of one or more of the

vertical muscles they are loathe to concede that the same factor is responsible for those of low degree. The paralytic nature of hyperphoria is evidenced by the variability in the amount of the deviation in the different directions of gaze. Considerable experience in measuring these cases has convinced me of the rarity of a truly comitant hyperphoria. However, even if the deviation should remain unchanged in the different directions of gaze it could still have been of paretic origin for nature makes a constant effort to transform every noncomitant deviation into a comitant one, so if the initial lesion was slight and the trouble of long standing it is quite possible that this might take place. It is my impression that a similar view on the etiology of hyperphoria was held by Duane and is also shared by White. If we are correct in this assumption, hyperphoria can be produced by any of the causes of ocular muscle paralysis. Considerable attention has been directed to the age incidence in hyperphoria owing to Hansell and Rebers finding that two-thirds of their cases were in people over thirty years of age. This does not mean that children do not have hyperphoria but rather that unless it is marked they readily overcome it.

Diagnosis: Various tests are used for the detection of hyperphoria and each method has its own adherents. The test employed is not so important as the manner in which it is done. Any muscle test to be of value must be done carefully. A haphazard examination is worse than none since it gives the tester a false sense of security. The mere determination of the amount of hyperphoria present in the primary position for distance and for near is not sufficient. For an accurate diagnosis we must know the amount of the deviation present in the six cardinal directions of gaze. Therefore some method must be used that will give us the necessary information. In my hands the most accurate results are obtained with the screen and parallax test of Duane supplemented by a careful plotting of the diplopia, when present. If one adopts as a routine in hyperphoria the measurement of the deviation in the different directions of gaze he will be struck by the frequency with which he can make a positive diagnosis of the paretic muscle.

The prolonged occlusion test for bringing out latent hyperphoria has received considerable attention within the past few years and while it may be of value in very selected instances I agree with Maddox who says, "A derelict machine is not so informative as a functioning one, though it is true we can learn something from it. The ocular apparatus is essentially binocular and when one-half of it is thrown out for a long period it must become one-sided, something like hanging from a cross bar with one arm." Furthermore Fink has shown that ordinary eyes taken at random exhibit strange postures after long monocular occlusion.

Treatment: Since hyperphoria is a phenomonon and not a disease, our therapeutic efforts should be directed at relieving the symptoms rather than at removing the deviation. It is well known that there is no train of symptoms pathognomonic of heterophoria and that the symptom complexes of it and of ametropia are so similar that at times it is difficult to differentiate between them, though a careful history will often be of great help in deciding which is the predominant factor. The headache of hyperphoria is more likely to be aggravated by watching moving objects than one caused by an ametropia, also reflex gastric symptoms are more common in muscular anomalies than in refractive errors. The blurring of vision with both eyes but clear with either eye alone is strongly suggestive of a muscular defect. Head tilt is the most suspicious of all signs that a hyperphoria exists. The extreme cases of ocular torticollis are easily detected but a very slight tipping of the head can be readily overlooked, and unless great care is exercised to keep the head perfectly straight during the examination a hyperphoria of considerable degree may be missed. One must learn to decide that the symptoms are due to

the muscular imbalance before being justified in treating it. We have all seen many cases with one or more degrees of hyperphoria without any symptoms, while others with this same error are miserable unless it is corrected. Unfortunately no definite rules can be laid down which can be followed without variation, for the treatment of hyperphoria is extremely individual. One must consider the refractive error, the occupation and the symptoms along with the findings, before deciding upon the correct treatment. An accurate history is therefore almost as essential as a careful examination in the proper management of hyperphoria.

In considering the etiology it was stated that most hyperphorias are of paretic origin therefore they do vary in amount in the different directions of gaze. The smaller errors are more nearly comitant than the larger ones, hence lend themselves better to prismatic correction. The almost universal use of prisms in hyperphorias of low degree speaks for its efficacy. Great relief usually follows the prismatic correction of one-half to two-thirds of the hyperphoria in these cases, yet occasionally this does not help. The most common cause of these failures is an absence of the hyperphoria in the lower field. We use our downward gaze so constantly that any overcorrection in this direction is likely to be more distressing than the original condition. Therefore it is extremely important to know the exact amount of deviation present in the lower field before proceeding with the correction. While this information is especially valuable in patients whose occupations require the constant use of the lower field it is also helpful in all cases where glasses are worn constantly, or only for near work. Therefore when considering prismatic correction of a vertical deviation a good rule of thumb is to correct no more hyperphoria than is present in the lower field. A hyperphoria of less than one degree rarely causes symptoms but the occasional case will arise in which the correction of a half degree of hyperphoria will be advisable. The largest amount of hyperphoria I have satisfactorily corrected by prism was nine degrees. The splitting of the prisms between the two eyes is advisable in deviations of two degrees or more. Prismatic correction should be considered only when repeated examinations have yielded uniform results. In my hands prismatic exercises have been of no use in the treatment of hyperphoria.

Hyperphoria is responsible for many lateral heterophorias, but the reverse does not appear to be true, certainly not with anything like the frequency that lateral deviations are produced by smaller vertical ones; therefore in handling these combined conditions it is best to correct first the hyperphoria and then later if necessary treat the lateral heterophoria. The soundness of this dictum is beyond doubt, but when the lateral deviation is so pronounced that it is unreasonable to expect its disappearance without treatment both conditions can be corrected at the same time.

The paretic origin of hyperphoria explains the wide difference of opinion on the value of medical treatment in this condition. If the vertical deviation has been produced by an acute paresis, the removal of the cause may effect a complete cure. On the other hand, if it is the result of a congenital paresis or of one long standing, little can be expected from such measures. Here again the measurement of the amount of deviation in the six cardinal directions of gaze and a careful history will be of great help. A deviation that is almost comitant is probably one of long standing while a very variable one is likely to be of recent origin. Careful questioning will elicit in the well-established case an indefinite history with periods of annoyance extending over years, while in the acute case it determines that the onset is definite and that the symptoms are usually pronounced. I agree with Peter that "Medical treatment is of little avail in a well-established case of hyperphoria", but temporary relief can be afforded many of these patients by attention to their general health. The hyperphoria usu-

ally does not disappear but as a result of improved general condition these patients overcome it more easily, so consequently their asthenopia is lessened. However in this respect hyperphoria does not differ from low refractive errors and other slight variations from the normal for they are all more productive of discomfort in the neurotic or weakened individual.

While many cases of hyperphoria are satisfactorily handled by these non-operative measures some can only be corrected by surgery. Before considering operation however according to Duane one must determine: "First, whether the symptoms are due to a muscular anomaly; second, whether they are likely to be sufficiently severe or sufficiently lasting to warrant interference; third, whether they can be remedied by some means other than operation". Furthermore it is necessary to consider the prospect of relieving the symptoms by operation and to weigh the dangers entailed by it. Having decided these questions the choice of type of operation to be used becomes a matter of diagnosis. Many oculists shrink at the mere thought of operating upon a vertically acting muscle either because of some unfortunate result or because of the wide-spread belief that such operations are usually unsuccessful. It is my firm conviction that this belief has largely resulted from the following statement found in so many of our standard text books on ophthalmology, namely, "in hyperphoria, if comitant, the best operation is tenotomy of the superior rectus. The fault is not with the statement but with the oculist who fails to find that the deviation is usually noncomitant. It is true there is usually no gross limitation of motility but a careful measurement of the amount of deviation in the six cardinal directions of gaze will, in the vast majority of cases, prove the noncomitant nature of the hyperphoria. Therefore no one operation is suitable for all cases of hyperphoria and the type employed will vary according to which of the elevators or depressors are involved. Duane laid down the following general rules for the selection of the type of operation in paralysis:

(DUANE). TABLE ILLUSTRATING CHOICE OF OPERATION IN MUSCLE PARALYSIS.

Affected Muscle	Operation of Choice
Superior Rectus	Tenotomy Inferior Oblique Opposite Eye
Inferior Rectus	Resection of Affected Muscle
Superior Oblique	Tenotomy Inferior Oblique Same Eye or Recession Inferior Rectus Opposite Eye
Inferior Oblique	Tenotomy Superior Rectus Opposite Eye

I believe these same general principles are applicable to the insufficiencies (incomplete paralyses) which account for our hyperphorias so a brief discussion of the reasons for these selections might be interesting.

Paresis of the superior rectus is commonly seen associated with marked overaction of the inferior oblique of the opposite eye. A tenotomy of this muscle therefore tends to limit the action of this eye to a corresponding degree to that of the affected eye. A shortening of the paretic muscle is likely to restrict the action of its antagonist (the inferior rectus) and thereby produce a troublesome diplopia in the lower field.

In paresis of the inferior rectus our only choice lies in a shortening of it since it is not feasible to weaken the superior oblique of the opposite eye. A tenotomy or recession of its antagonist (the superior rectus) would tend to produce a double paralysis rather than correct the existing one.

In involvement of the superior oblique a secondary spasm of its antagonist (the inferior oblique) is likely to ensue, in which case considerable improvement may follow a tenotomy of it. A recession of the contralateral inferior rectus is indicated to equalize the limitation of downward motility in the two eyes.

Tenotomy of the superior rectus is

reserved for the very rare condition of paresis of the inferior oblique of the opposite eye.

Conclusions

1. Routine measurement of the amount of hyperphoria present in the six cardinal directions of gaze will establish the paretic origin of the vast majority of hyperphorias.

2. Proper surgical treatment depends upon an accurate diagnosis as to which of the elevators or depressors are involved.

30 West Fifty-ninth street.

A SIMPLIFIED METHOD OF MUSCLE RESECTION FOR SQUINT

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NEW YORK

A simple method of muscle resection by the use of two doubly-armed sutures is described. Presented before the Ophthalmological Section of the New York Academy of Medicine.

In the course of squint operations much of the discomfort in spite of good local anesthesia comes from traction on the muscle. Deep injection of novocain is not used because it is not advisable to interfere with the normal action of the muscles.

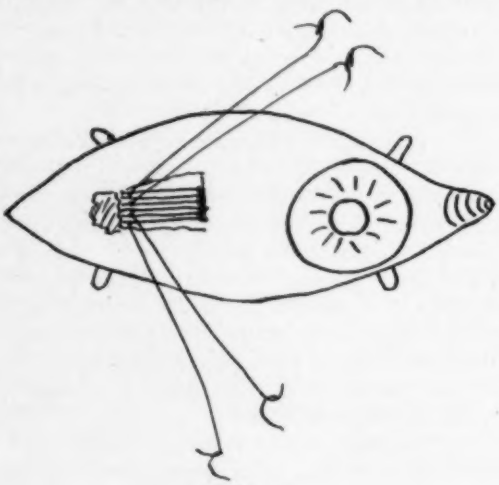

Fig. 1.

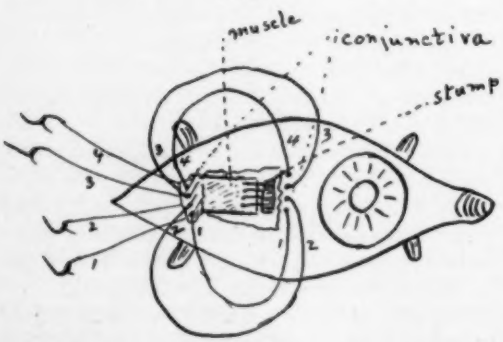

Fig. 2.

(Agatston). Figures illustrate diagrammatically the various steps in the operation.

Bearing these facts in mind it has always been my aim to make muscle operations as simple and short as possible. With the ordinary local anesthesia, muscle recession done by the simple method I described (Amer. Jour. Ophth., 1924, v. 7, p. 361) is practically painless. In spite of the fact that I use only one suture and do not make use of the muscle forceps, the results compare very favorably with those obtained by other methods.

It occurred to me that in doing the muscle resection originally described by Dr. Robert Reese, there was too much unnecessary dragging on the muscle and too many unnecessary steps. I do not dispute the fact that the operation is a good one, I simply decided that the sutures could be put into place in a simpler and quicker way.

Steps of the operation:

1. Incision of conjunctiva over line of insertion.

2. Dissection of conjunctiva with exposure of muscle.

3. Opening of Tenon's capsule and introduction of strabismus hook under muscle.

4. Upper and lower border of muscle freed by dull dissection until sclera is exposed. Hook removed.

5. Have patient look to the opposite side so as to expose muscle as far as possible.

6. At a point at which it is desired to resect, grasp the lower half of the muscle with the ordinary mouse-tooth forceps. Through this lower half pass one needle of a doubly-armed suture. (No. 6 twisted silk is sufficiently heavy and easier to pass through than the braided suture.) The second suture is passed through the upper half of the muscle in the same way.

7. Complete tenotomy 2 mm. anterior to the sutures.

8. With the sutures raise the muscle away from the sclera to make sure that there are no adhesions.

9. Cut off the redundant muscle still hanging at the normal insertion.

10. Pass the two lower needles through lower half of the stump at the insertion in the usual way including the sclera under the stump and conjunctiva on the corneal side; pass the two upper needles through the upper half of the stump.

11. Pull up the resected muscle with a hook in front of the sutures. Complete the dissection of the conjunctiva on the canthal side.

12. Pick up the receded conjunctiva at the canthus with all the needles.

13. Again pull up the resected muscle with a hook in front of the suture.

14. Tie the two sutures with three single knots taking care that the muscle does not slip back between knots.

The most vital part of the operation is really accomplished by the sixth step. The rest is simple. The only time that it is necessary to pull on the muscle is when tying the sutures. The operation performed in this way will make local anesthesia possible in a larger percentage of cases, especially in children.

2 West Eighty-seventh street.

CHRISTIAN'S SYNDROME

A case report

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A comprehensive review of the literature on this unusual disease is presented. The clinical picture is more conclusive in diagnosis than the variable histologic findings. The disease begins in early childhood, presents exophthalmos, diabetes insipidus, bone lesions, retarded growth, pulmonary fibrosis, and gingivitis as some of the more prominent clinical symptoms. The case reported here did not exhibit all these findings. Treatment with radium was followed by improvement. From the Division of Ophthalmology, University of Chicago.

In 1905 T. W. Kay[1] reported a case of exophthalmos with polyuria and destructive skull lesions, but his report remained unnoticed until 1921. Schuller[2] in 1915 described three cases of a peculiar disease in children in whom the main symptoms were those which Kay had noted earlier, though one, a lad of 16 years, had in addition manifestations of adiposogenital dystrophy. Present interest in this disease process dates back to 1919 when Christian[3] in such a clear way described the clinical course of a case characterized by the above three main symptoms, that now this syndrome bears his name.

Hand's case reports in 1921,[4] including one which he had published in 1893 as a case of general tuberculosis,[5] contain the first histologic description of the lesions found in this condition. The first case (1893) showed "nodular masses of small roundcelled infiltration in the liver, spleen and kidneys." Two years before Hand came in contact with his second case, a tumorlike lesion had been removed from the calvarium. The pathological report on this read: "No gumma; no sarcoma; slight degree of inflammation; mainly myxomatous change."

In 1924 Weidman and Freeman[6] reported two cases under the caption of "Xanthoma Tuberosum." Their second case, reported earlier by Griffith,[7] had shown the usual symptoms of Christian's syndrome plus jaundice and hypercholesterolemia. At autopsy they found lesions in the lungs, liver, skull and brain, which showed histologically fibrosis and chronic inflammatory changes. Because of this histological picture they felt that they were dealing with a systemic chronic inflammatory process, on the basis of which they believed they could explain most of the clinical symptoms. The xanthomatous nodules in the viscera were considered to be coincidental. The case reported by Berkheiser[8] as multiple xanthocytic myeloma in a child and that of Schultz, Wermbter, and Puhl[9] belong to this group. Thompson, Keegan, and Dunn,[10] in reporting a case, describe the cells found in the bone lesions as "large oval cells with sharp borders, with clear, slightly granular cytoplasm and small compact, centrally placed nuclei". In the cytoplasm they describe a finely divided lipoid material. Other cases of Christian's syndrome were reported by Grosh and Stifel,[11] Denzer,[12] Stowe,[13] and Kyrklund.[14]

R. H. Jaffe,[15] in an exhaustive paper on the reticulo-endothelial system published in 1927, brings xanthomatosis, lipemic diabetes, Niemann-Pick's disease, and Gaucher's disease under the heading of "fat storage, resulting from disturbance of the lipin metabolism," but he does not mention Christian's syndrome. Dr. R. S. Rowland[16] goes a step farther; he reported two cases of Christian's syndrome and, after a careful study and review of the literature on the xanthomas, Gaucher's disease, Niemann-Pick's disease, and Christian's syndrome, he concludes that they are all manifestations of the reaction of the reticulo-endothelial system to a state of abnormal fat metabolism, and includes all of them under the term "Xanthomatosis." He believes that the rapidly developing forms of abnormal fat metabolism lead to generalized involvement; the slow forms coupled

with focal irritation, lead to the localized forms.

In this paper, as well as in another published in 1929,[17] Rowland describes Christian's syndrome at length. He defines it as a slowly progressive disease with familial tendency, which has periods of remission "but eventually overwhelms the vital organs and brings on death." He believes that in the development of the bone lesions there is first a focal hyperplasia of the reticulo-endothelial elements of the bone marrow, forming a nodule and that the adjacent bone is destroyed through pressure and the action of giant cells. In describing the various forms under which the lesions may appear he writes: "The structure is very variable; angioma, fibroma, granuloma and giant cell sarcoma characteristics are shown." In quoting Broders he agrees that many cases masquerade under various names, such as sarcoma, myeloidsarcoma, myeloid endothelioma, myxoxanthoma, granuloma, giant cell tumor, and giant cell sarcoma. He describes the evolution of the lesions in bone and states that the early ones contain typical foam cells, but that their cholesterol content stimulates the local tissues to fibrosis so that "the extensive fibrosis, the rare areas of necrosis, the cyst formation, the round cell and eosinophilic infiltration" are only found in the older lesions and occur in the course of their evolution as "secondary changes".

In summarizing the clinical picture of Christian's syndrome, Rowland points out the following: even sexual distribution, onset early in childhood, exophthalmos, diabetes insipidus, bone lesions, retarded growth, pulmonary fibrosis, gingivitis, polydipsia, presence of associated chronic infections, and absence of cutaneous lesions.

Sosman[18] states that all of the classical symptoms need not be present in order to make a diagnosis of Christian's syndrome. The essential finding, he believes, is the bone lesion. Of his three cases, one was a man 55 years of age. All of these cases responded well to x-ray therapy. The clinical improvement was prompt and striking in all; the bone lesions healed slowly in the adult but quickly in the young. X-ray treatment did not prevent the formation of new lesions and when the treatment was discontinued the lesions increased in size.

Wheeler[19] published recently the end stages of a case which had been reported in 1929 by Hausman and Bromberg.[20] In this paper Wheeler gives the first histological report on biopsy material from the orbit in this syndrome. A section of tumor surrounding the optic nerve was excised and sections of this were shown to two pathologists; one made a diagnosis of chordoma, the other of xanthoma. As there was no bulging of intracranial tissue through the eroded areas of bone in the orbit at the time of operation, Wheeler justly concluded that the exophthalmos was due to the intra-orbital growth of tissue.

Dr. Phemister[21] has clinical and histological data on three unpublished cases. In the histological preparations and photomicrographs of these cases there is a strikingly large number of eosinophiles, and in one case the section is almost an exact duplicate of that from our own.

The above brief review indicates that while the syndrome characterized by exophthalmos, diabetes insipidus and defects in membranous bones (Christian's syndrome) may be recognized by the clinician with comparative ease, the histologic picture of the bone lesions has led to widely different conclusions and in some instances has hindered, rather than aided in making a diagnosis. It is particularly because of the latter feature of the disease process that we felt justified in adding this one to the group of about twenty-five reported cases.

Case report

T. M., hospital number 19896, a white female child, admitted to the department of ophthalmology of the University of Chicago Clinics February 18, 1930. She was born into an apparently healthy family on January 26, 1929. The delivery was normal. The infant was in good health at birth and weighed 8 lbs.

12 oz. She was breast fed for 9 months and her development normal. Her only illnesses were frequent head colds during the winter months.

In September, 1929, the child's mother noted that the infant's right eye was more prominent than the left. This proptosis increased but was never associated with pain or inflammation and vision was apparently unaffected. In December the right cornea was found to be lower than the left. Several physicians were called in attendance but the

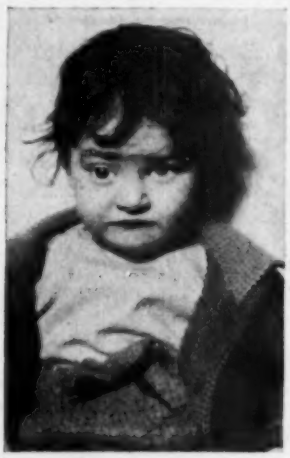

Fig. 1 (Jason and Abraham). Photograph taken February 19, 1931.

case remained undiagnosed and treatment was not successful. There was no evident impairment of the patient's general health, no loss of weight and no polyuria.

At the first examination the right cornea was 5 mm. lower than the left; the exopthalmometer readings were 11 mm. for the left and 15 mm. for the right eye, and the left iris was blue, whereas the right had a yellowish tinge. (Figure 1) The remainder of the examination failed to reveal anything of importance. The first impression was "orbital tumor" and hospitalization was advised for x-ray study of the orbital bones under general anesthesia. Accordingly, the child was admitted February 19, and on the basis of x-ray plates, the following report was returned by Dr. P. C. Hodges.

1. "Neoplasm eroding superior lateral margin of right orbit with two associated lesions in the right frontal bone."

2. "Raise the question as to whether possibly the lesions are xanthoma." In the report the lesions are described as "punched out". The position and relative size of each lesion is shown in Figure 2. No new bone formation was evident.

The child was readmitted on March 3 for further study. On physical examination she was found to be poorly nourished but normal, aside from specific eye findings. The blood, on the day of admission, showed: Hemoglobin 90 percent; red cells 4,600,000; white cells 7,400; polymorphs 54 percent; small lymphocytes 28 percent; large lymphocytes 13 percent; eosinophiles 3 percent; and basophiles 2 percent. The Wassermann and Kahn reactions were negative on the patient's and her parents' blood. On March 4 a biopsy of one of the frontal lesions was done by Dr. Percival Bailey. The record of the operation reads in part as follows: "A bluish, slightly discolored soft area was seen in the skull and a button of bone was taken out with the trephine, including this area. The bone was densely adherent to the dura beneath and when removed it could be seen that the nodule of soft tumor penetrated the inner table of the bone and was adherent to the anterior surface of the dura mater. The nodule of tumor was shelled out of the bone and fixed in 10 percent formalin. . . . It could be seen that the lower incisor tooth on the left side was loose and this was extracted." Blood taken from the external jugular vein at operation showed: white cells 10,350; polymorphs 70 percent; large lymphocytes 4 percent; small lymphocytes 21 percent; eosinophiles 4 percent; and basophiles 1 percent. Frozen and paraffin embedded sections were made and a pathological diagnosis of "lymphogranuloma" was returned on these. X-ray examination of most of the remaining bones of the skeleton did not disclose further lesions. Radium therapy was agreed upon and the first dose 480 milligram-hours was given on

March 8 over the right superolateral margin of the involved orbit. The patient was discharged March 11, 1930. There is no report on the urine at this time and chemical analysis of the blood was not made.

The infant was in the hospital again from April 10 to the fourteenth for radium treatment. The right supraorbital region received 600 mgm. hrs., the site of operation 480 mgm. hrs. and the other frontal lesion 620 mgm. hrs. At this time there was a difference of only 3 mm. in the exophthalmometer readings. The eyes appeared normal otherwise. X-ray examination showed no change in the size of the lesions.

On April 22 the right disc was again examined and pronounced normal. The mother stated that the child had been nervous ever since the operation but had not shown ill effects from the radium. An attack of tonsillitis was reported during May.

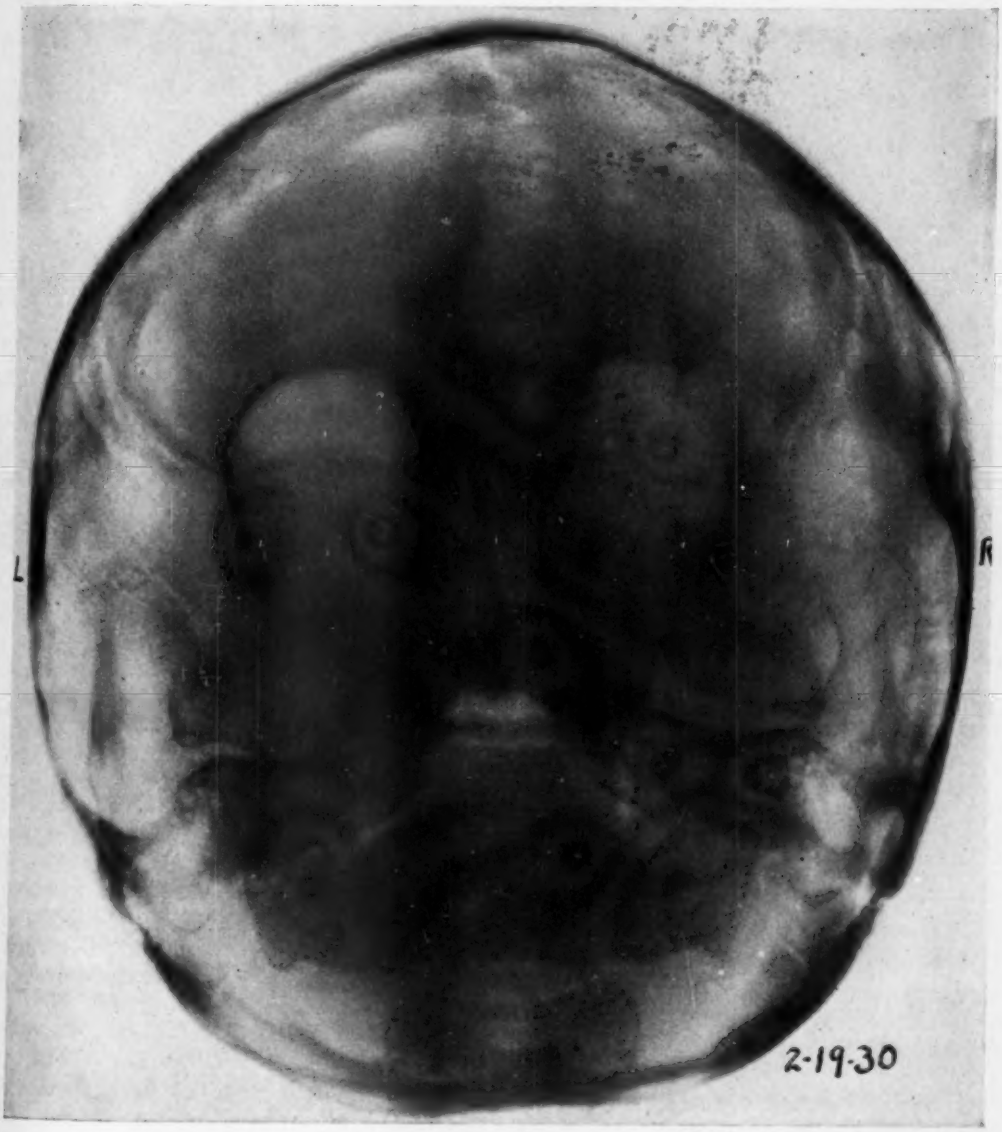

Fig. 2 (Jason and Abraham). Showing skull lesions when first seen.

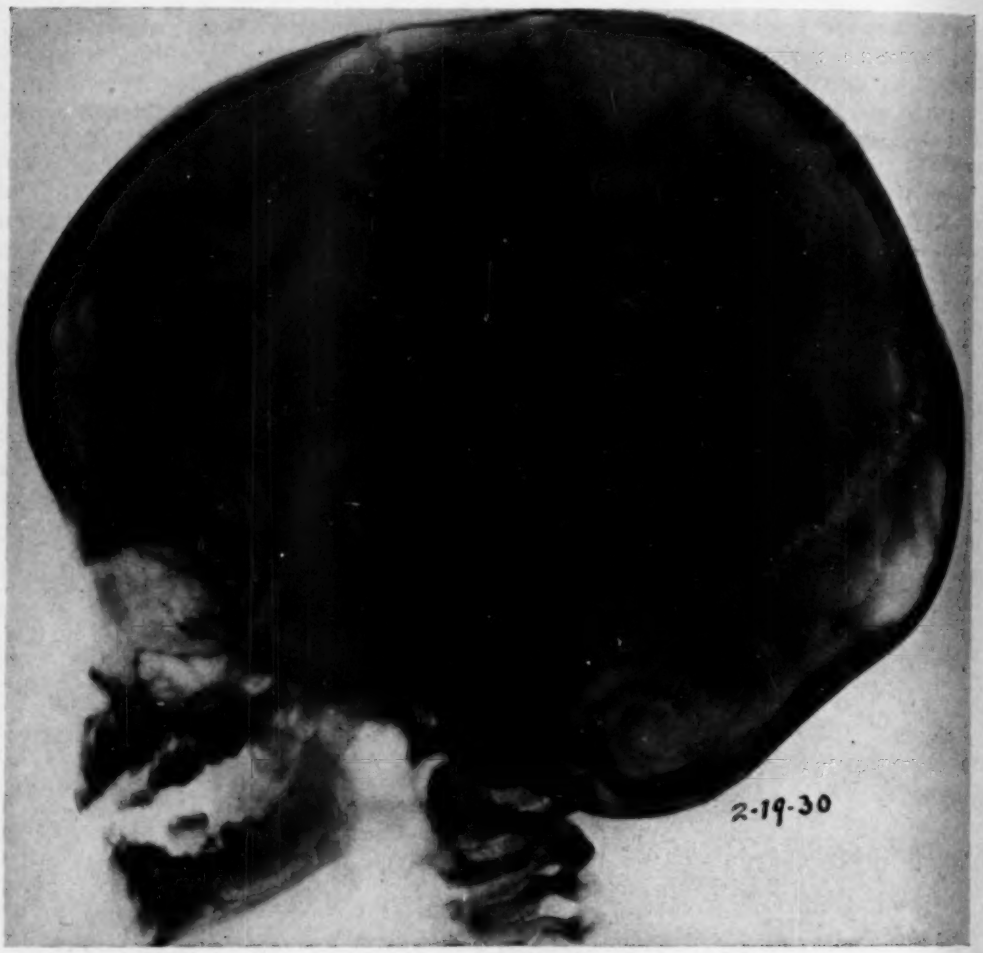

Fig. 2 (Jason and Abraham). Showing skull lesions when first seen. Lateral view.

The child was seen in the Department of Pediatrics on June 10. There was no appreciable change in the blood picture at this time. The urine was negative for albumin and sugar, was alkaline in reaction, and contained a few pus cells. There was not enough for specific gravity determination. X-ray plates of the chest, taken on June 21, showed no shadow suggesting lymphogranuloma of the mediastinal glands.

On November 4, 1930, there was a suggestion of a new lesion in the left parietal region as seen by x-rays, but examination was not satisfactory. The child was rehospitalized November 10 in order to make better plates under general anesthesia. At this time there was no appreciable change in the eye findings. The x-ray report was:

1. "Considerable bone regeneration in the lateral superior wall of the right orbit."

2. "New lesion developed in the ascending ramus right mandible and left parietal bone." The new lesions are shown in figure 3. On rechecking the entire series of pictures it was decided that the existence of a lesion in the mandible was questionable.

The next admission was from November 19 to 21 for radium therapy. The right supra-orbital region received 300 mgm. hrs., the site of operation 120 mgm. hrs., the frontal lesion 120 mgm.

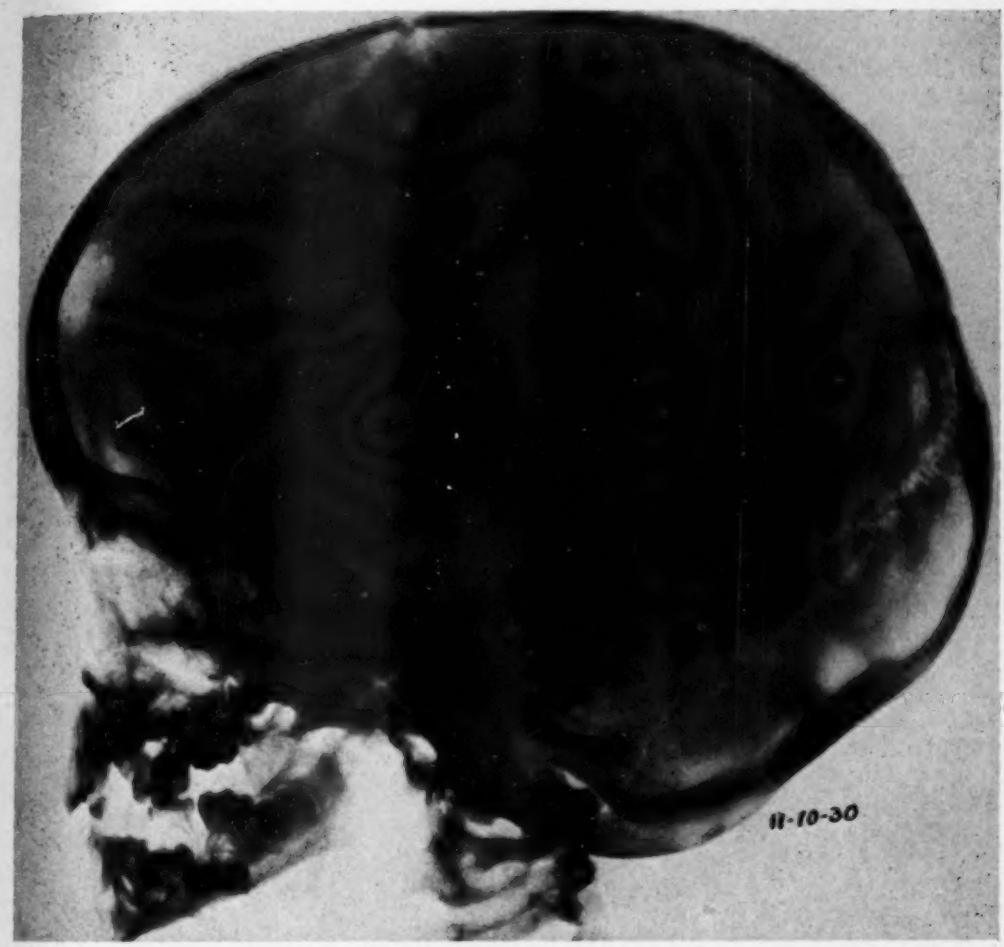

Fig. 3 (Jason and Abraham). Showing new lesion in left parietal bone.

hrs. and the parietal lesion 300 mgm. hrs. Again the blood failed to show any appreciable change. The urine was normal, specific gravity 1.014.

The next admission was January 22 to 24, 1931. Examination of the eyes suggested objectively a decrease in the proptosis. The exophthalmometer readings, however, were: 15 mm. for the right and 12.5 mm. for the left eye. The first blood cholesterol determination was made at this time. It showed 193 mgm. per 100 cc. of blood. A report on the x-ray plates taken at this time reads: "The lateral and superior wall of the right orbit is practically intact but the roof of the orbit in its lateral portion does not show complete regeneration of bone".

The last admission was on April 29, 1931, for further examination and study. It was noted at this time that the patient had a severe gingivitis of upper and lower gums and many of the teeth were loose. The mother had noticed the loose teeth during the past year. It will be recalled that one loose tooth was extracted at the time of the biopsy on March 4, 1930. A smear from the gums showed many fusiform bacilli and the spirilla suggestive of Vincent's angina. The condition was treated with irrigations of H^2O^2 and 1:1000 solution of $KMnO^4$ for a week with excellent improvement in the condition of the gums. Finally, however, extraction of five teeth was necessary. Light treatment was given the aveolar tissue.

Despite the large amount of radium applied to the right orbital region, the right eye showed nothing wrong in its fundus or media. The right exophthalmos as taken by several of the staff varied between 2 and 4 mm. (irregularity due to child's poor coöperation). Objectively a slight reduction was evident. The urine at this time was acid, had a specific gravity of 1.032 and was negative for albumen and sugar. The blood picture was normal; red cells 4,500,000; white cells 6,800; polymorphs 68 percent; large lymphocytes 20 percent; small lymphocytes 12 percent; calcium 7.9 mg. per 100 cc. serum; chlorides 102.5 cc. N/10 Cl/100 cc. serum; phosphorus 5.11 mg. /100 cc. serum; and most interesting, the cholesterol now was 135 mg. /100 cc. as compared with 193 about 4 months previously. Tests with tuberculin were negative. Following is the x-ray report at this time by Dr. C. S. Capp:

"The irregular circular opening in the right frontal bone is still apparent. No extension that I can discern of any pathologic process in this area which is

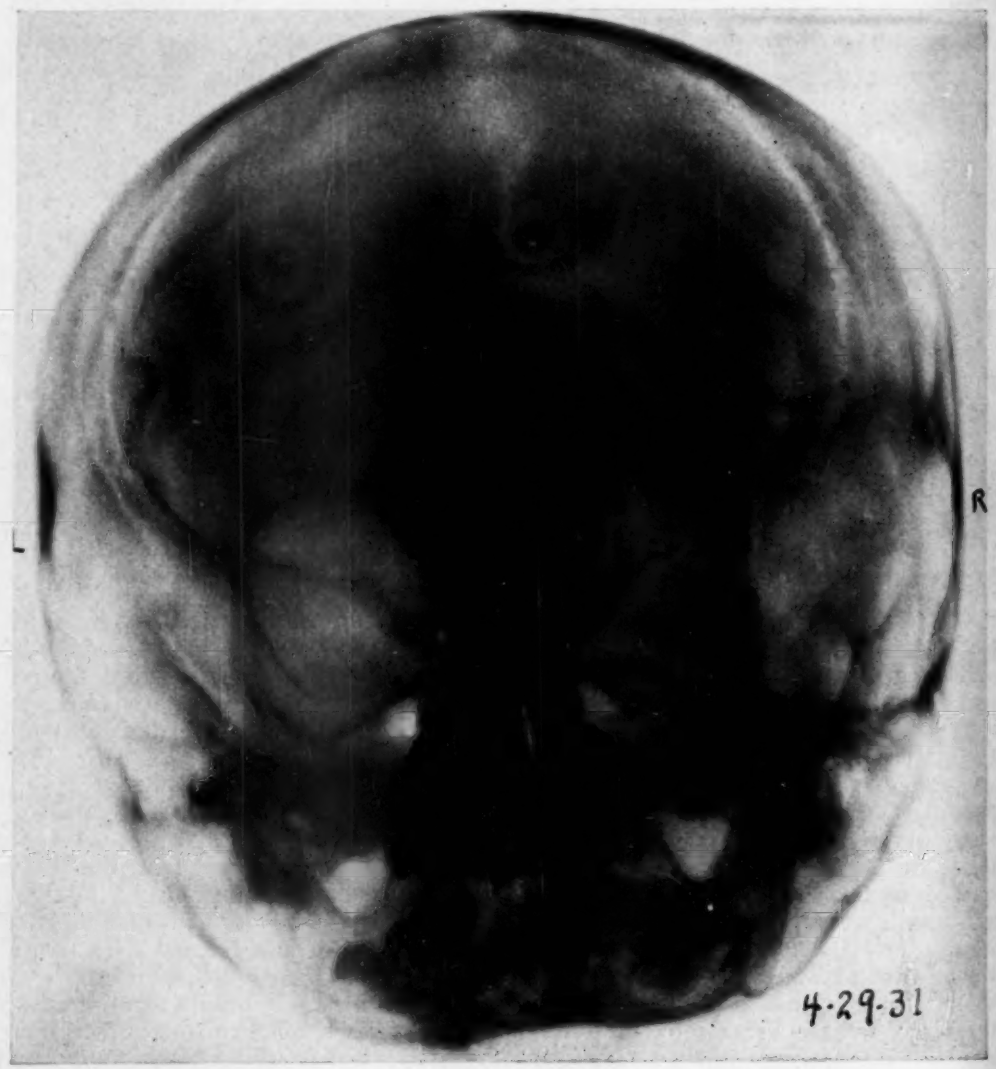

Fig. 4 (Jason and Abraham). Showing almost complete bone regeneration.

site of previous biopsy. The solitary lesion in the left temporal bone one inch lateral to the anterior fontanelle and one-half inch posterior to the left coronal suture is not apparent in these films. Believe there must be complete regeneration of bone. The lesion in the ascending ramus of the right mandible is questionable. There appears to be complete bone reformation of the lateral wall of the right orbit. However, at the junction of the lateral wall with the roof of the orbit which forms a part of the greater wing of the sphenoid bone there has not been complete bone regeneration." (Figure 4)

In brief, we have a girl, now 3 years and 3 months old, normal at birth and of healthy stock, who has had a proptosis of the right eye for at least 19 months; who has had lesions of the bones of the skull, shown by x-ray, for at least 14 months; who has had loose teeth and gingivitis; whose urine findings were negative (including tests for Bence Jones body on July 9, 1931); whose blood cholesterol was still at the upper limit of normal when taken about 10 weeks after regeneration of bone was noticed by x-ray and about 11 months after first x-ray findings of bone lesions, and was well within normal limits (28.5 percent less) when taken 3 months later when bone regeneration was almost complete. Under radium the lesions treated improved. The question remains as to what part the radium played in the improvement. Sosman's cases improved under x-ray treatment. Heath's case improved with no record

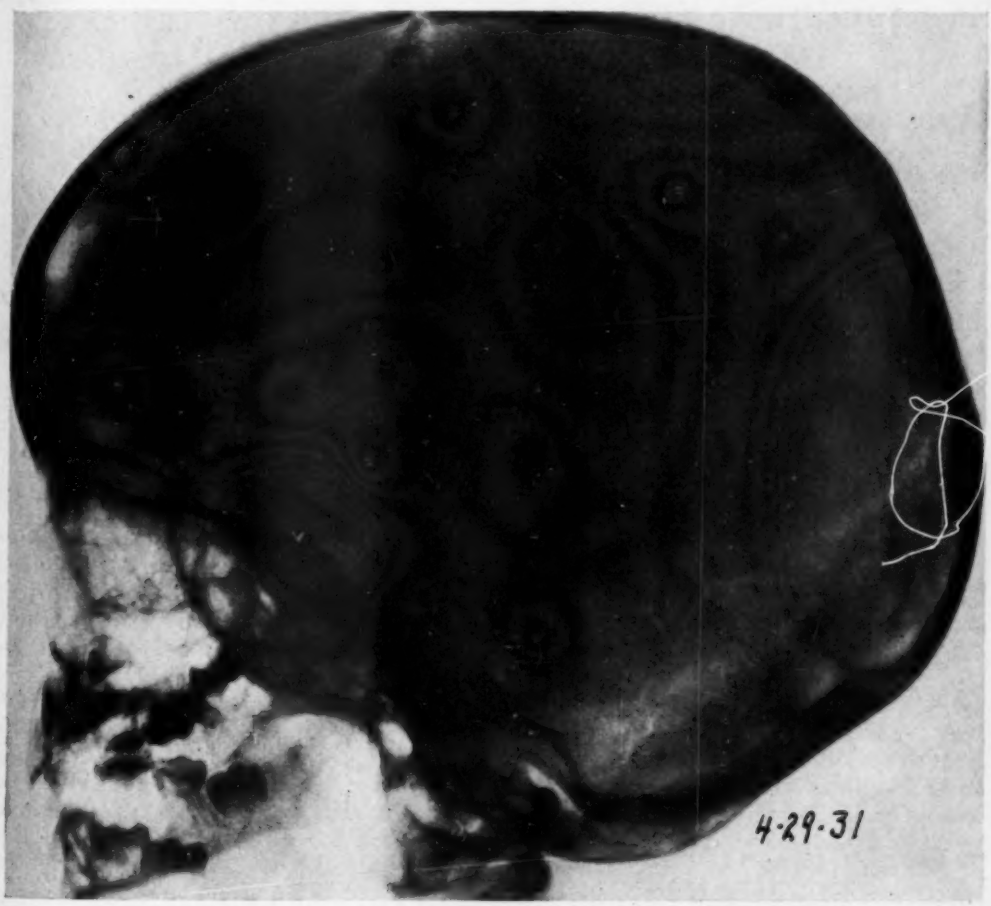

Fig. 4 (Jason and Abraham). Showing almost complete bone regeneration. Lateral view.

of x-ray treatment and without any other consistent treatment.

A restudy of hematoxylin and eosin sections of the biopsy specimen revealed the following:

In the section there are at least 6 types of cells. There were vascular channels lined with endothelium and nucleus also appears to be vacuolated and some cells contain small vacuoles in their cytoplasm. None of the cells are typical foam cells. Here and there are areas which appear necrotic, in which the nuclei stain poorly and show bizarre shapes as though they were disintegrating. No Dorothy Reed cells are found

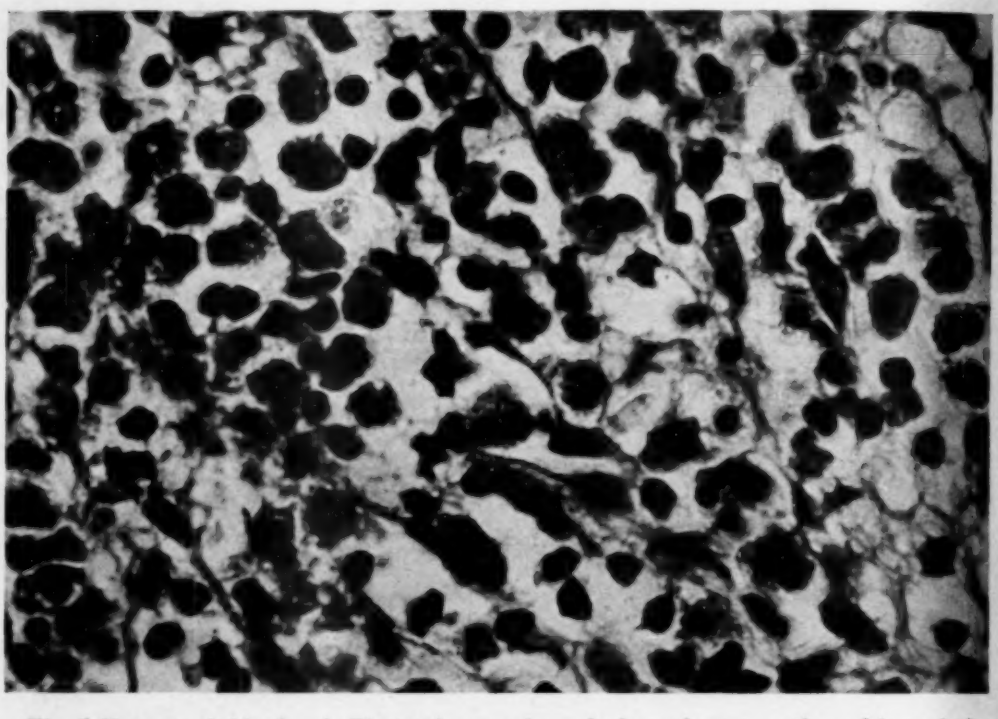

Fig. 5 (Jason and Abraham). Photomicrograph made from frozen section of bone lesion with a magnification of 1,200 diameters. It shows many eosinophiles, small giant cells, elongated cells resembling those of connective tissue, cells with indentations of the nucleus by vacuoles in their cytoplasm, an occasional lymphocyte, and cells with slight nuclear vacuolization.

containing red blood cells. Lymphocytes are found in relatively small numbers. Eosinophiles occur in abundance, scattered about the section as well as aggregated in nests. Many of these are not mature cells. Here and there are foreign body giant cells. The main tissue consists of cells showing marked irregularity in size and shape. Some resemble young connective tissue cells. Many of them have a relatively small nucleus in a clear space surrounded by a cell membrane. A number contain relatively large vacuoles which cause indentations of the nucleus. In some the and there are neither mitotic figures nor the epitheloid cells of tuberculosis. (Figure 5).

Heath[22] explains the exophthalmos noted in his case as follows: "The softening and bony loss at the apex of the orbit, especially on the right side, found in case 1 at necropsy, allowed the anterior pulling forces to draw the globe forward. The regularity of the proptosis in case 2, with useful movements in all directions, indicated that the extrinsic muscles were affected not singly but as a group. The forward position of the globe was dependent on the

symmetrical easing forward of the apex of the orbit with its muscular ring attachments and the accompanying xanthoma masses in the orbit." Were this explanation correct the eyes should show an outward and upward rotation due to the retained effect of the inferior oblique muscle, acting against the partial loss of power of the superior oblique. In our case this explanation is not adequate because the apical portion of the orbit was not affected; moreover, in spite of the almost complete regeneration of bone in the orbit, there is no appreciable decrease in proptosis. We are led, therefore, to conclude with Wheeler[19] that the proptosis is due to new formations in the orbit, which in our case have not diminished in size hand in hand with the regeneration of bone.

The absence of polyuria and polydipsia in our case is explained on the absence of bony changes in the sella turcica. In this regard we are in accord with all the authors of case reports, who, after Hand,[4] have questioned the original conclusions of Christian on the cause of polyuria and polydipsia. Symptoms suggestive of involvement of the sella turcica are present when lesions are present in this region and press on or involve the tissues in this area. This is supported in the autopsy findings of such xanthoma nodules (Weidman and Freeman[6]).

Christian's case report, and those which preceded it, were purely clinical descriptions. Hand was the first to follow his cases through necropsy. His gross and brief histological descriptions and the reports which have followed indicate, as Howland has so clearly demonstrated, that there is a wide range of variation in the microscopic picture and cellular content of the lesions found associated with the syndrome. This lack of uniformity in histological appearance has led to varied diagnoses in different cases and to decided differences of opinion as to the same case. The cases reported by Hand, Weidman and Freeman, Berkheiser, and Kyrklund, though belonging clinically to this group, received different diagnoses on the basis of the histological structure of their lesions. Stowe's case, Wheeler's case, and our own were each seen by two or more pathologists who were unable to agree on the diagnosis. In our case even the same section was used, and one pathologist gave a different opinion on seeing the section a year later.

Rowland made only passing comment on the presence of eosinophiles in the bone lesions seen as a part of the syndrome. They were present in the cases studied by Phemister[21] and in some areas were very numerous. The bone destruction was brought about largely by fibroblasts rather than by giant cell osteoclasts along its margins.

A clinical feature which may be of interest is that apparently not all of the cases have their onset in childhood, as one of Sosman's cases and a case studied by Phemister were in male adults. Rowland's gloomy prognosis may be questioned, as one of the cases originally described by Christian is still alive and apparently in perfect health (Sosman).

Rowland has done more than any other in clearing up the apparently conflicting views on the microscopic picture of the lesions associated with Christian's syndrome, but further studies and observations are needed before there will be a general acceptance of his conclusions. At present, and perhaps it will be so always, it is very difficult, if not impossible, to make a diagnosis of Christian's syndrome solely from a study of a histological section of one of the lesions. It would seem, then, that major dependence must be placed on the clinical and x-ray findings.

1930 Wilshire blvd., Los Angeles.

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NOTES, CASES, INSTRUMENTS

FIXATION OBJECT FOR USE IN RETINOSCOPY OF PRESBYOPIC CASES

ALEXANDER G. HOUGH, M.D.
MILWAUKEE

The contra-indication for the use of cycloplegia in presbyopic patients and the difficulty they have in maintaining relaxation of the ciliary muscles makes retinoscopy difficult and uncertain.

For retinoscopy of the macular region in presbyopic eyes it is necessary that the patient look almost directly at the retinoscope and imagine he is looking through the examiners head at some distant object. Few people can do so and the results of the retinoscopy are unreliable.

To overcome this I have devised a target, very simple in construction and very satisfactory as to results. It consists essentially of a wooden base on which is fastened a post six inches long and two inches square. This post is placed on end with a light socket on top. A tube forty inches long and two and one-half inches in diameter is slipped over the post, the electric light wire coming out underneath. At the side of the top of the post is a sliding rod at the upper end of which is a small convex mirror so tilted that the reflected rays from the light in the tube are projected horizontally. The light bulb used is colored a violet blue.

The rays from the violet end of the spectrum focus at about one-third of a millimeter in front of the most luminous part of the spectrum therefore calling for one diopter less accommodation than that usually used in looking at white light. The psychic effect of distance as seen in the convex mirror and lack of detail in the object fixed is conducive to steady ciliary relaxation.

The method of using this device is to place it between the examiner and the patient. The mirror is raised to the level of the examiner's and patient's eyes and so turned that the blue light is seen only by the eye that is not to be examined. This is necessary in order to prevent stimulating accommodation by convergence. The attention is now on the blue light and the macular region of the non-fixating eye may be easily retinoscoped. No difficulty has been

Fixation object for retinoscopy. M—mirror; S—sliding rod; T—tube; L—light bulb; B—base.

found in keeping attention fixed on the blue light. The rheostat controlling the retinoscope light should be adjusted so as to produce as dim a light as possible consistent with a clear reflex.

Following this examination by dynamic retinoscopy at reading distance in order to ascertain the comfortable ratio between convergence and accommodation constitutes a very satisfactory objective examination of presbyopic cases.

Marquette University School of Medicine.

NEUROFIBROMA OF OPTIC NERVE

H. L. Hilgartner, M.D.

H. L. Hilgartner, Jr., M.D.

Will Watt, M.D., F.A.C.S.
AUSTIN, TEXAS

E. S., aged three, was first seen on June 5, 1930. The parents stated that during the last three or four months they had noticed that the right eye had gradually become more prominent than the left and also that the child did not see so well from the right side. The patient had never complained of any pain nor discomfort.

Fig. 1 (Hilgartner, Hilgartner & Watt). High power microphotograph of tumor.

Examination showed a definite exophthalmos of the right eye. There was no dilatation of the veins, nor conjunctival edema. The pupils were unequal, the right being larger than the left. The examination of the fundus showed a blurred and indistinct disc. No masses could be felt in the orbit.

X-ray by Dr. Dalton Richardson showed no neoplasm in the sella turcica region and no neoplastic involvement of the orbital bones. However, roentgenograms in the oblique position showed an increased density in the right orbit, suggesting a neoplasm.

On July 8, 1930, a Krönlein operation was done, and a mass encapsulated in the optic sheath was excised at the base of the globe and point of entrance of the nerve into the orbit.

Histological examination by Dr. Henry Hartman of San Antonio showed a neurofibroma of the optic nerve.

The child has been seen several times since the operation, and the exophthalmos has disappeared. She has excellent movement of the eye except when she looks deep to the right, then the right eye lags slightly. There is no ptosis and the pupil now reacts to light and there is no corneal anaesthesia.

Box 472.

LEFT ORBITAL CELLULITIS WITH HOMOLATERAL SINUSITIS

Hunter W. Scarlett, M.D. and James A. Babbitt, M.D., F.A.C.S.
PHILADELPHIA

Orbital cellulitis arising from an ethmoid infection is not extremely rare, but when accompanied by a complete homolateral sinusitis, as was the case herein reported. It awakens interest, especially as there was a large erosion through the ethmoidal wall, connecting the left ethmoid sinus with the left orbit.

The patient, a boy of seven years, was first seen twelve days after the left orbit started to swell. He gave a history of striking his left eye with a football helmet three days prior to the beginning of the orbital trouble. When first examined December 9, 1930, there was marked swelling of the left upper lid, less of the lower, with a violaceous discoloration of the former, a distinct tenseness on palpation, and extreme pain over the inner third of the upper lid, where there was an area of induration. The eyeball was pushed forward and downward, and the lids could be separated only with difficulty. There was marked limitation of ocular movements in all directions. He complained of a slight frontal headache, radiating to the left temple.

Under ether anesthesia the left orbit was incised and gauze drains were inserted in two places; one at a point external to the inner angle of the orbit, and the other at about the junction of the outer and middle thirds. Both in-

cisions were made deep into the orbit, just below its upper rim. No pus was encountered.

The day following the operation the lids were less tense, but the second day they became tight once more, so a consultation with a nose and throat surgeon was advised. One of us (J. B.) was called in and on examination found a left sided ethmoiditis, with the possibility of the other sinuses being involved. X-ray examination revealed a complete left sided sinusitis, with an erosion through the orbital wall from the left ethmoid sinus.

Further orbital operation consisted of a large incision through the brow line, commencing at the junction of the middle and inner thirds, and extending inward and downward to a point just above the inner angle of the orbit. The incision was pushed deep down to the floor of the orbit.

The rhinologic procedure included a large window beneath the left inferior turbinate into the antrum, removal of the middle turbinate on that side and exenteration of the ethmoid labyrinth including the posterior cells, and removal of the anterior wall of the sphenoid. Through and through connection with the orbital opening was made. Drainage packing was inserted, but was gradually removed within forty-eight hours.

A few hours after the above operation the patient's temperature which had been 101° dropped to normal, and remained there throughout his uneventful recovery. The proptosis and swelling of the lids rapidly disappeared.

Cultures taken from the orbit showed the presence of staphylococcus albus and aureus, and of both hemolytic and non-hemolytic streptococci.

When one realizes that about two-thirds of the orbital wall is composed of thin, paper-like bone, which at the same time is the partition of the sinuses, it can readily be understood how the orbital contents are prone to infection, when the sinuses are involved.

There are certain interesting points about this case: (1) That so definite an exophthalmos with the orbital cellulitis should have occurred without actual meningeal or cavernous sinus disturbance; (2) that such a severe degree of disturbance could have gone on without more definite toxemia; (3) that a condition obviously due to ethmoid infection, with probably an early breakdown of the intervening wall, should during the early days have presented so little intranasal evidence.

Conclusions: (1) Every case of orbital cellulitis should have an early x-ray examination of the paranasal sinuses, to determine the extent of the sinus involvement and the possible erosion into the orbit, and a consultation by a rhinologist; (2) a better result as far as ultimate cure is concerned, will be obtained if both the sinuses and orbit are opened, thus allowing through and through drainage.

230 S. Twenty-first street.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Section of Ophthalmology

March 13, 1931

Dr. John Brown presiding

Corneal abscess following foreign body

Dr. F. J. Pratt (Minneapolis) reported the case of a man, aged thirty-three years, an upholsterer with a foreign body in the left eye, which was removed from the cornea in the lower temporal quadrant, two days previously. The foreign body proved to be a piece of enamel from an upholstering spring. There was a large abscess of the left cornea. The following day the thermocautery was used at 160° for one minute, and this was repeated two days later. The eye was practically healed three months later.

Anatomic variations of the optic chiasm

Dr. W. I. Lillie (Rochester) gave a lantern slide talk on this subect.

Discussion. Dr. C. N. Spratt (Minneapolis) said that these cases of aneurysm of the cerebral vessels were interesting but very confusing to the average oculist who saw so few of them. Several years ago he had operated on a patient with an aneurysm of the circle of Willis, in whom severe and persistent headache was the only symptom. A palliative decompression was performed and the patient died on the table. He recently had a patient with complete optic atrophy in one eye with diminished vision in the other eye but no marked changes in the field. She was operated on elsewhere and an aneurysm of the anterior cerebral artery was found. The patient died on the fourth day.

In this connection Dr. Spratt presented three patients. One was first seen in 1924, with a history of severe headaches for seven years, with changes in the face and increasing loss of vision in the temporal side of the right field. A pituitary tumor was removed by Dr. Cushing. The vision and fields had returned to normal, with relief of the headaches. The second was a patient with homonymous loss of fields in the superior temporal portion of the right eye and the superior nasal portion of the left eye with no loss of central vision. In two weeks the fields had returned to normal and had been so since. It would seem that this was due to a cortical hemorrhage. The third patient was a girl who had blindness in both eyes, apparently following an automobile accident, with papillitis of four to five diopters. A palliative decompression was done. The patient had complete recovery of vision and fields. The optic nerves however, in both eyes were white.

Dr. Lillie (in closing) said that the three cases presented by Dr. Spratt were very interesting. The first case fell into the large group of acromegaly without visual disturbances, as the pituitary gland enlarged and protruded downward into the sphenoid sinus instead of affecting the optic chiasm primarily. Only 33 to 35 percent of the people with acromegaly had chiasmal visual defects.

The second case, that of the woman who had had an homonymous quadrant hemianopsia which persisted about two weeks and then disappeared, probably should be classified in the migraine or vascular group, Dr. Lillie thought. Inasmuch as there had been no progression but definite regression, intracranial tumor could easily be ruled out.

The third case he felt suggested a rapidly developing bilateral optic neuritis with restoration of vision, leaving full pale discs as the only sign of her previous trouble.

Dr. Lillie stressed the importance of careful ophthalmologic examinations,

including perimetric fields, in all patients who had a visual disturbance with the fundus changes not revealing enough pathology to explain the visual loss. In this way only, would the early chiasmal lesions and the common retrobulbar syndromes be recognized early enough so that the proper therapy, whether medical or surgical could be instituted to the advantage of the patient. Too often these cases of retrobulbar neuritis and pituitary tumors had intranasal surgery performed repeatedly before the true significance as to the real cause of the condition was recognized. By far the largest number of retrobulbar neuritis cases seen at the Mayo Clinic could be classified as due to multiple sclerosis, and should be suspected by all ophthalmologists. The neurological examination and spinal fluid would reveal specific findings to substantiate this suspicion, and needless intranasal and other surgery would be eliminated.

WALTER E. CAMP,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY

April 20, 1931

DR. HARRY S. GRADLE, president

Foreign body in iris

DR. HALLARD BEARD presented a man with 5/10 vision in an eye injured by wood about two weeks before. A light colored foreign body was seen imbedded in the periphery of the iris. After treatment there was still some ciliary injection.

Discussion. DR. ROBERT VON DER HEYDT said that the foreign body should be removed. He would use eserin to raise the iris and avoid entanglement.

DR. HALLARD BEARD said that since an operation was hazardous and there was a chance that the eye might quiet without it he questioned the advisability of subjecting the patient to the risk. The foreign body might be in contact with the lens.

Tuberculous iritis and keratitis

DR. HALLARD BEARD showed a patient who complained of failing vision for some months, with frequent attacks of iritis. There was a moderate amount of injection in both eyes, and extensive diffuse vascularization in the deeper layers of the cornea resembling keratitis. In the right eye the deep sclerosing keratitis was seen; the pupil was absolutely fixed, and unaffected by mydriatics. Treatment by cocaine and powdered atropine apparently caused no dilatation, but after two weeks the eyes were free from injection. On the iris was seen a great number of new superficial vessels. Serological tests and general physical examination, including Wassermann and Kahn, were essentially negative. Vision in each eye was 20/200. The corneal vessels, most of which were empty, could be seen only with the slit-lamp; the vessels on the iris had entirely disappeared. There was a reaction to the intradermal tuberculin test of .2 c.c. 1:10,000 solution, but no focal reaction in the eye. The vitreous was turbid and the optic nerve heads could not be seen. Refraction did not improve vision. The course of the disease had apparently been arrested, but what could be done to improve vision?

Discussion. DR. ROBERT VON DER HEYDT said this seemed to be a typical description of tuberculous keratitis and iridocyclitis, because many of the vessels in the cornea were superficial. An iris which was bound down could not react to medicinal stimulation. If the patient be left alone for six months his vision would probably be greatly improved.

DR. SANFORD GIFFORD was of the opinion that excellent results could be obtained in sclerosing keratitis with tuberculin therapy.

DR. BEULAH CUSHMAN said she was still using tuberculin and was much pleased with the results. Cases with positive tuberculin reactions, which had recurrent hemorrhages into the vitreous frequently before coming to the clinic had been free for six months to a year without recurrence under the treatment. Treatment should be used only in those cases which proved to have an allergic reaction to a definite

dose of tuberculin, and the dosage should be graded to the diagnostic dose. Vitamin D seemed to be a great help when there was corneal involvement, especially in the photophobia of the tuberculous cases, and healing took place much more rapidly when it was used.

In phlyctenular keratitis the most spectacular results had been obtained with vitamin D (Viosterol). By removing vitamin D the symptoms returned in spite of all other treatment, which included ultraviolet radiation, and by resuming vitamin D the condition immediately cleared up.

Dr. George F. Suker said that it was advisable to continue tuberculin therapy as long as there was vascularization in the iris. When there was no further circumcorneoscleral injection it might be stopped gradually; generally, however, a case should be under this therapy for two or three years because of possible recurrences.

Dr. Hallard Beard (closing) said that the patient had not been on tuberculin therapy, a test only was made. All the symptoms had improved and the cornea was clear. The remarkable feature was the complete disappearance of the numerous and conspicuous new found vessels in the irides.

Kuhnt-Junius disease

Dr. M. L. Folk presented a man, aged sixty-five years, who had appeared about a year ago with complaint of poor vision. Vision was, O.D. 15/200; O.S. 3/200, eccentric. He had had heart trouble and thromboangitis of a number of years standing. The fundus in the right eye showed small hemorrhages in the macular region surrounded by an area of edema. In the left eye was a whitish elevated area one p.d. in diameter, with a small punched-out area in the center. It appeared to be macular degeneration. After some months when again seen there was very little change. At this time the same picture was seen in the right eye as was previously noted in the left, a grayish-white elevated vascularized area in the macula, about one to one and a half p.d. Vision at this time could not be improved with glasses. Because the condition was bilateral and in view of the ophthalmoscopic picture, it was most likely a case of Kuhnt-Junius disease.

Keratoconus

Dr. Leo Mayer presented a man twenty-seven years of age, who began to have difficulty with vision in the left eye about three years ago. There was a typical keratoconus; vision in the left eye was 1/100, and could not be improved; in the right eye 10/100, which was improved to 20/100 with —13 D. cyl. at axis 45 degrees. There were distinct laminations in Bowman's membrane in both eyes; Descemet's membrane did not appear to be involved. The man had a four plus Wassermann; basal was zero.

Discussion. Dr. Robert Von Der Heydt said that not much was known as to etiology in this condition, except that possibly there was an inherent weakness of the fiber structure in the middle of the cornea. Dr. Mayer spoke of lamination in Bowman's membrane, this was not characteristic of keratoconus; the striping was deeper within the parenchyma. If the lenses and fundi were normal this patient's vision could probably be improved to normal with a contact glass in the right eye, and the left improved to 20/40. Whether he could learn to use it was another question; that depended on his mental attitude and willingness to be of help to himself. (Note. The patient was later fitted with Zeiss contact glasses and his vision improved to 20/30 right and left 20/20—.)

Epithelioma of the lower eyelid

Dr. Sanford Gifford presented a woman from whom an epithelioma involving one-third of the lower lid had been removed. The defect was corrected by a sliding flap after Imre's method. A slight ectropion followed a small hematoma which necessitated the removal of a few stitches.

Discussion. Dr. M. L. Folk asked if radium or x-ray had been used on this

case. At the Meller Clinic of Vienna it was believed that results were much better with radium alone without surgery. They used surgery only for the resulting ectropion.

DR. SANFORD GIFFORD (closing) said that the patient preferred operation to radium or x-ray. The dosage was uncertain; recurrences were frequent. In epitheliomata which were freely movable and in the middle of the lid, surgery was preferable. If at the angle or adherent to the bone, where a poor cosmetic result was certain, radium would be better. The combination of surgery and radium was never good in these cases.

A glaucoma study

DR. MICHAEL GOLDENBURG presented a paper on this subject which was published in the September number of this JOURNAL, p. 944.

Discussion. DR. WILLIAM F. PETERSON said there were vascular changes which undoubtedly played a rôle in glaucoma. In normal individuals they occurred and it was possible that in the predisposed glaucoma patient physiological adjustments to unusual blood chemical changes did not take place with necessary rapidity and glaucoma symptoms were precipitated. The blood calcium might vary from 8 to 12.5 mgs. per 100 cc., being high in the mid-menstrual periods and low during the period and afterward. In the male there were similar changes, but not to the same extent. The pH change showed a great variation. The plasma colloids were of particular importance because of their relationship to water metabolism. In a woman, water was held in the tissues pre-menstrually, and released during the menstrual period. There was a distinct co-relationship between the change in pH and the appearance of capillary changes.

DR. THOMAS D. ALLEN said that Dr. Goldenburg had made the definite statement that the pump action theory of Thompson was impossible, but inasmuch as that theory had been fairly well accepted, he believed some proof should be offered.

DR. G. HENRY MUNDT thought that in the final studies in the etiology of glaucoma it would be found that the blood serum was very important. Sufficient work had already been done to make it probable that there was clumping in glaucoma, especially in the acute inflammatory form.

DR. RICHARD GAMBLE said that in congenital glaucoma or hydrophthalmos, absence of the canal of Schlemm or fetal tissue blocking the entrance into the canal, was frequently noted. Did these findings explain the cause of the glaucoma?

DR. WILLIAM F. PETERSON said as to the instability of proteins, that that would be an interesting observation if it occurred in glaucoma; he was not aware of this. Assuming that there really was a vascular disturbance in glaucoma there must also be autonomic, chemical and hormone changes associated. If colloidoclastic shock actually occurred it would be evidence of a change involving not only the contents of the vessels but the vessels themselves.

DR. MICHAEL GOLDENBURG explained that the nature and consistence of the scleral spur as well as its structural relationship and attachments to surrounding parts made the Thompson theory untenable. The development of the drainage angle was the most important anatomic factor in the predisposition of an eye to glaucoma. An absence or relative arrest of development of Schlemm's canal representing different fetal periods would account microscopically for glaucoma in its congenital and juvenile forms and probably in the adult form if such eyes could be studied before gross changes occurred.

Cyanosis retinae

DR. PETER C. KRONFELD read a paper on this subject which is published on p. 1108 of this number of the JOURNAL.

Discussion. DR. SANFORD GIFFORD said that he had seen two cases which presented practically the same picture, one apparently secondary to changes in the lung. In this case there was not

so much elevation of the disc, and no marked arteriosclerosis. One was a child and the other a woman of forty-five years of age.

Dr. E. V. L. Brown said that the marked tortuosity of the retinal vessel in the absence of any arteriosclerosis brought to mind the classical comparison made between these two conditions in the textbooks. For both conditions there was an actual increase in the length of vessels as compared with the normal between any two points. This condition of increased length was first stated as a characteristic of arteriosclerosis by Thoma. In increased tortuosity this increased length took in the plane of the retina (spreads out on the surface) whereas in arteriosclerosis the vessel actually dipped back into the retina, even disappeared from view in a clouded retina. The anatomical sections in Dr. Kronfeld's case showed that the vessels did actually dip back into the retina, they even cut entirely through it and touched the pigment epithelium, although the clinical ophthalmoscopic pictures and the structure of the vessels did not otherwise at all speak for any arteriosclerosis.

Dr. Louis Bothman asked if there was any pulsation in the retinal vessels.

Dr. Richard Gamble mentioned a similar case in which the vision had varied during periods of several minutes from 20/25 to 20/40. The time between changes of vision was too short to permit taking tension to see whether that played any part in the change.

Dr. Leo Mayer asked if there was any explanation for the papilloedema which was present.

Dr. Peter Kronfeld (closing) believed that there was no difference in the fundus picture in cases of congenital heart disease and in fibrosis of the lungs. In his collection there were eyes of a patient whom he had observed at the same time, forty-five years of age, who had tuberculosis of the lungs which finally led to extensive fibrosis of the lungs. The respiratory surface was cut down considerably and exactly the same fundus picture resulted as in congenital stenosis of the pulmonary artery.

The widening of the entire vascular bed as seen in cyanosis retinae took place as dilatation and increase in length of the vessel tube. Thus the retinal vessels had to change the level and go back and forth between inner and outer surface of the retina. In this respect the vessels in cyanosis behaved like those in arteriosclerosis, in which elongation of the vessel was one of the early findings.

The systolic pressure in his case was 85, the diastolic not much lower. There was no visible arterial pulsation. Transient obscurations and flickering scotomata were very frequent in polycythemia. In Dr. Gamble's case the visual disturbance was probably caused by impeded circulation in the retina and in the choroid and not by abnormality in level of the intraocular tension. Meller (Vienna) in looking at Kronfeld's case said it certainly showed that increased blood-content of the eye did not always lead to increased tension. The tension was taken many times and always found between 15 and 18 mm. of mercury.

Behr studied one case of polycythemia and explained the edema of the nerve head as the result of lymph flow through the optic nerve.

The necropsy in Kronfeld's case revealed diffuse edema of the brain and marked dilatation of the cerebral vessels. These two factors might have produced the choked disc if it was assumed that they became more marked after the skull had reached its final size. Another possibility of explaining the papilloedema would be the assumption that the central vessels occupied too much space in the retrobulbar part of the nerve. Thus the nerve was incarcerated by the pial sheath, which looked extremely tight in the specimens. He had watched the choked disc for over two years and still the specimen did not show any atrophy of peripheral nerve fibers.

Robert Von Der Heydt,
Secretary.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

April 20, 1931

DR. HILLIARD WOOD presiding

Episcleral tubercules

DR. KATE SAVAGE ZERFOSS reported the case of Mrs. D. M., aged twenty-eight years, who had complained of redness of both eyes for two months. There had been no pain or photophobia and the condition had apparently remained stationary.

The patient's mother had died of tuberculosis twenty-one years before. The patient had lost approximately thirty pounds over a period of ten years.

Examination revealed marked bilateral injection of the ciliary and conjunctival vessels. The left eye showed three tubercules 3 to 4 mm. from the limbus, one in the lower nasal, one in the upper temporal and one in the lower temporal quadrant. The last was the largest. The average elevation was 3 mm. and the greatest diameter was 4 mm. The margins were not clearly defined. Vision was 20/20 in the right eye; 20/30 in the left. Pupillary reactions were normal. The fundus in each eye was normal. Wassermann and Kahn tests were negative; intradermal tuberculin test was markedly positive. X-rays of teeth and sinuses were negative. X-ray of chest showed minimal diaphragm adhesions of left base. Chest examination was negative. The tonsils were small and injected.

Treatment consisted of instillation of one percent atropine in the left eye, administration of cod liver oil and injections of old tuberculin. Ten days after the first injection one tubercule was observed to have increased in size and elevation while the other lesions had diminished and were less injected. After twenty-four days all tubercules had disappeared and a mild injection persisted. Two periods of increased activity occurred as noted by pain and more vascularization. When next seen the cornea was slightly infiltrated in the lower periphery with extensive deep vascularization.

H. C. SMITH,
Secretary

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM

Annual Congress

April 23, 24, and 25, 1931

MR. LESLIE PATON presiding

Retinal detachment treated by cautery puncture

MR. C. SHAPLAND read a paper on an analysis of 100 cases treated by Gonin's method. It was assumed that a hole in the retina had been discovered, and an attempt made to occlude it by a cautery puncture. In 34 cases seen during the same period either no hole was found and a cautery puncture was carried out in the old way over the most prominent part of the detachment, or the detachment was regarded as of too long standing, the rent as too extensive, or the age too great to justify operation.

Fifty-six of the 100 patients were males, 44 females, and their average age was 41½ years. The cases fell into four groups: (1) high myopia; (2) low myopia; (3) aphakias; (4) emmetropia. Trauma, local or general, apparently played a part etiologically in a small proportion of the myopic detachments, and in a larger proportion of the emmetropic group. Of the 56 myopic cases, nine gave a history of a blow on either the affected eye or an adjacent part of the head just before the onset of the visual defect for which advice was sought. Two had had recent heavy falls; while in one, who suffered from bronchitis, the straining of the severe cough seemed to have been an exciting factor. In the emmetropic group of 41 cases, 16 gave a history of recent local injury, one of general trauma.

Retinal holes could be roughly classed into five groups: (1) festoon-shaped, situated at the extreme periph-

ery, corresponding to Gonin's "disinsertion" at the ora serrata; (2) rounded, punched out like holes; (3) arrowhead and horseshoe-shaped rents, the head of the arrow being on the disc side; (4) radial slit-like tears; (5) irregular rents.

By far the commonest site for a retinal hole was the periphery of the temporal half of the globe. In this series 54 percent of the retinal disinsertions at the ora occurred in the inferotemporal quadrant of the globe, 73 percent in its lower half. The rounded hole showed a tendency to be multiple, eleven of the cases in this group presenting more than one hole; and the maximum number of holes was six. The diameter of the holes varied from less than 0.1 mm. to at least the size of the disc itself; while their average distance from the ora serrata was two disc diameters. In this series 50 percent occurred in the superotemporal quadrant of the globe. The arrowheaded ones occurred in the temporosuperior quadrant eleven times, superonasally seven times. This type of rent tended to be large, and usually required more than one cautery puncture to seal it. When it occurred, the upper half of the globe was involved in 83 percent of the cases; in none was this type of rent multiple. The arrowheaded kind showed the greatest incidence among the high myopic cases.

Of the 100 cases, 40 were discharged from hospital cured, and 17 showed improvement either in visual acuity or in the visual field. He regarded as cured those in whom the retina had become reattached and the field was full when they left the hospital. Of the cured cases 21 were females, 19 males. The average age of the cured patients was 34½ years. The average duration of the detachment from the time the visual symptoms started to admission to hospital was seven weeks. The longest duration in which successful result was obtained was 12 months, the shortest, seven days. No successes were achieved in the aphakic group of cases. Among the successful cases were 18 of retinal disinsertion, 16 of the round hole, six of the arrowhead rent. There were none of the radial slit-like tears or of irregular rents among the cured cases. Of the 40 primarily successful cases, the detachment recurred in eleven, and this was after an interval which varied from a week to eight months. The reattachment occurred in three of the emmetropias and in three of the myopias and in five of the high myopias.

Discussion. MR. FRANK JULER had had 32 percent of cures by the Gonin method. One was that of a man aged fifty years, whose vision before the operation was reduced to hand movements on the temporal side. After the Paquelin cautery applications both the field and the vision were improved at once. The retina was in place up and in, but was still detached below. Another small hole was detected in this area, and eight and a half months after operation the retina was in place throughout, and the visual field was full. Another case was one of bilateral detachment of old standing, in a man aged twenty-seven years. Gonin's operation resulted in a vision of 6/24 in the right eye, 6/5 in the left, the fields were full and the retina firmly fixed.

Treatment of chronic blepharitis with vaccine

MR. M. M. S. MAYOU said the condition varied in severity from slight cases to those in which there was destruction of the lid margin, hair follicles, glands and thickening owing to chronic inflammation of the lid. Infection with the Morax-Axenfeld bacillus usually occurred causing a thickening of the conjunctiva. Treatment consisted of removing foci of infection and providing healthy surroundings. A mixed vaccine of staphylococcus and Morax-Axenfeld bacillus five hundred million each per cc. was injected into the eye lid with good results. Even one thousand million of each, divided between the two upper and lower lids, caused no undue reaction. Injecting the vaccine under patches of eczema resulted favorably.

Non-luetic Argyll Robertson pupil

MR. R. FOSTER MOORE added fifteen cases in supplement to his paper of 1924. The visual acuity was good. Usually one eye alone was involved. The pupils were semi-dilated and practically inactive to direct or consensual light stimulus. The etiology was obscure.

The nature and antiquity of stereopsis

MR. CHAVASSE said that if squint was due to a defect of the fusion faculty he supposed that lameness could be said to be due to a defect of the walking faculty. He said that reactions, not sensations, were observable. He gave a classification of visual reaction from protoptic up to stereoptic and said that stereoptic reactions of a grade above the lowest were observable in ordinary fishes, but that the lowest grade was probably not represented in any surviving species. He considered, therefore, concomitant convergent squint, so far from being a failure to acquire the latest evolutionary accomplishment, appeared to be due to the frustration of an activity almost as old as the vertebrate.

Hereditary aspects of Leber's optic atrophy

DR. RITCHIE RUSSELL (Edinburgh) said this disease did not seem uniformly to allow the rules of inheritance of a single recessive character. In Leber's disease an affected male rarely had affected grandsons. The mode of inheritance was not the same in the various sex-linked diseases, and in some strains at least an accessory factor was concerned in their development. Dr. Russell's paper dealt with four cases in the same generation in a family living in the Orkneys. The following was a typical example. The first patient, a man aged forty years, had loss of vision and pains in the legs. At first there was only slight dimness of vision after reading; it did not interfere with his work as a carpenter. Later he had severe pains in the right eye which lasted a week and with these pains the vision failed rapidly in both eyes. Coincidently he had pains in both feet, and they became swollen. Vision had improved but little. He had five healthy children. Higher cerebral functions were apparently undisturbed. Both discs were blue-gray in color; the edges were sharply outlined, and the lamina cribrosa was prominent. No changes were apparent in the maculae or the periphery of the retinae. The pupils were 4 mm. in diameter, circular, equal and regular in outline. Ocular movements were full in all directions. Neither nystagmus nor diplopia was present but the patient could not converge. No disturbances of muscle power, tone or coördination was noted; neither was there any abnormality to light touch, to pain or appreciation of passive movement. Three cases in this generation followed a consanguineous mating. Perhaps a second factor, not sex-linked, and multiplied by the consanguinity, was concerned in the manifestation of the disease. Dr. Russell did not think this likely, but the consanguinity might have reduced the general vigor of the stock and so caused a dormant trait to become manifest again. Leber's disease showed no evidence of its presence until years after birth and in this it stood alone in this group of diseases.

Ocular symptoms in osteitis deformans

MR. A. W. ORMOND reported on a case whose symptoms began in 1920. These were pains in the bones with curvature of the radius. There was no preceding illness to account for this disease. When seen first by Mr. Ormond in 1928 the left eye showed fundus changes with 6/60 vision. The right eye later became involved and showed organizing tissue in the macula. The left macula was atrophic with sclerosed choroidal vessels. There were gross changes surrounding the disc and there was retinal pigment disturbance.

The ocular defects which had been reported in association with Paget's disease were due to separate conditions: (1) changes caused by the optic foramen pressing on the nerve and leading to changes in the fields of vi-

sion, with loss of visual acuity and the production of optic atrophy; (2) definite retinal and choroidal disturbance with hemorrhage the result of widespread vascular changes which did not affect the nerve head at all. Many observers had found in the eyes of patients suffering from osteitis deformans a condition similar to that found in advanced disease consequent on inherited syphilis. Some thought the disorder one of the perverted metabolic type. In one recorded case marked improvement followed a change from a partially carbohydrate to an almost exclusively protein diet. With the diagnostic aid of improved radiography the disease did not appear to be as rare as was formerly supposed.

Most people thought a toxin of some chemical deficiency, acting through the blood stream and affecting the vascular system generally, was the cause. Most cases of long standing had some evidence of vascular changes, both in the fundus oculi and in the body generally.

Papilloedema

MR. EUGENE WOLFF (in collaboration with MR. FRANCIS DAVIES) read a report of work carried out in the Anatomy Department of University College, London, on the pathology of papilloedema. The conclusions arrived at were: (1) Non-diffusible dyes injected into the cranial subarachnoid space, at pressures which were compatible with life, did not enter the optic nerve; (2) claims to have produced papilloedema by injecting fluids into the subarachnoid space at pressures compatible with life were not upheld by this study. Structural reasons were advanced for the special site of commencement of papilloedema in human beings, and for the extent of the distribution of the edematous fluid associated with papilloedema.

Intracapsular cataract extraction

DR. A. H. H. SINCLAIR showed a cinematograph film of his present mode of performing this operation. He pointed out that the safety of this procedure had now been greatly enhanced by the universal employment of akinesia of the orbicularis, by the retroocular injection of novocain and adrenalin, and by the laying in readiness, prior to making the incision, of a conjunctival suture.

(Reported by H. Dickinson.)

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

May 12, 1931

DR. A. C. LEWIS presiding

Intraocular foreign body

DR. M. B. SELIGSTEIN presented a case of foreign body in the eye ball with 15/15 vision, in a colored male, aged twenty-four years, seen first four days following injury.

A piece of steel from a chisel was localized by x-ray in or just outside the sclera above and nasally. Either the foreign body or wound of exit was seen in the retina as a white area surrounded by hemorrhages with a black straight line in the middle. The vitreous was slightly cloudy but was clearing.

This case was seen in consultation with Dr. J. B. Stanford who advised that no attempt should be made to remove the foreign body. The vision was steadily improving in the injured eye and was now 15/15-4. The vision in the right eye was 15/15-3.

Discussion. DR. J. B. BLUE thought this case should be carefully watched because of the possibility of siderosis.

DR. R. O. RYCHENER thought it likely that the foreign body was reposing outside the sclera and might require no further treatment. However, in view of the extensive laceration of the retina and the fact that inflammatory reaction had not yet subsided, the possibility of late retinal detachment must be borne in mind.

Retinal detachment

DR. HARRY MINOR'S clinic presented G. P., colored male, aged twenty-five years, who was seen May 7, 1931, stating that he had received a blow from

a blackjack to his left eye three weeks ago. The eye was completely closed for two weeks and after the swelling had subsided he was unable to see distinctly. Sight was missing from the lower half of the visual field. There was some edema of the lids of the left eye with slight injection of the globe. The pupil was active. There were a few vitreous opacities and several areas of subretinal hemorrhage. There was a large area of detached retina. In some regions there was a band-like formation, apparently connective tissue.

There was a stellate appearing body extending from the macular region upward. Tension was normal to fingers. The right eye was normal. Laboratory report indicated urine negative; Kahn negative; blood pressure 120/90; vision O.D. 20/20 and J. 1; O.S. 20/100.

Discussion. Dr. R. O. Rychener thought there was a rupture of the choroid in addition to the retinal detachment as there was a vertical slatey gray pigmented area between the disc and macula and most of the pathology was more deeply situated than the retina.

R. O. Rychener,
Secretary.

AMERICAN JOURNAL OF OPHTHALMOLOGY

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

Address original papers, other scientific communications including correspondence, also books for review and reports of **society proceedings** to **Dr. Lawrence T. Post, 524 Metropolitan building, Saint Louis.**

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INTRACAPSULAR VERSUS EXTRACAPSULAR

Like the dispute, now almost forgotten, concerning the relative merits of limbal extraction (as introduced by Daviel in the eighteenth century) and of the couching operation which had been used for thousands of years all over the world, the controversy as to the advantages and disadvantages of intracapsular as compared with extracapsular extraction of cataract may rage for a hundred years. It may even happen that the two methods will persist side by side for many centuries to come.

The satisfaction afforded by uncomplicated success in an intracapsular operation cannot be gainsaid. In the appearance of the eye, in clearness of vision, in rapidity of healing, and in freedom from visual distortions, the intracapsular operation is a blessing to the patient and a feather in the cap of the operator. Yet it is significant that quite frequently one or other ophthalmic surgeon of experience has been heard to admit in public that, if he had to stand in the place of the patient, he would choose the extracapsular operation.

Perhaps the arguments on either hand have never been more fairly and judicially weighed than in a new section which has been added to the chapter on cataract extraction in the third German edition of Meller's "Ophthalmic operations" (Augenärztliche Eingriffe—see also under Book Notices, American Journal of Ophthalmology, October, page 1068. Analytically, in the light of his experience in a great European clinic, and with an ability for clear description that has perhaps never been excelled by any writer on surgical procedures, Meller describes detailed technique for preliminary anesthesia and for every step of the intracapsular operation. He rejects the Indian Smith and the Barraquer methods as unsuitable for general adoption, and views with greatest favor the technique of Stanculeanu and Török as practiced and recommended particularly by El-

schnig and Arnold Knapp. He lays stress on the necessity for deep orbital injection of novocain, yet warns against the difficulties created by softening of the eye after such injection, especially if an appreciable interval is permitted to elapse between the injection and the operation.

The surgeon's grasp upon the lower part of the anterior capsule, by means of toothless forceps, is very largely a matter of touch rather than sight, and herein lies an important source of difficulty and uncertainty in this type of intracapsular extraction. Even the most experienced and skillful operator cannot with confidence foresee the exact degree of resistance which he is likely to encounter in the capsule, in the zonule of Zinn, or in the limiting membrane of the vitreous; yet upon the relative strength of these structures depends primarily the possibility of success. Meller urges that the bite taken by the forceps must not be too large (about two millimeters). Plenty of time must be employed in the gradual see-saw movements of the closed forceps by which the suspensory ligament is to be broken. The skill required for a satisfactory grasp of the capsule with toothless forceps is much greater than that demanded in tearing out a bite of the capsule with toothed forceps in the extracapsular method. There is a great difference, as between one case and another, in the promptness with which the zonule ruptures under the pull of the capsule forceps and the pressure of the strabismus hook upon the lower margin of the cornea.

Meller never uses anything stronger than homatropin as a mydriatic before, and always introduces eserin ointment into the conjunctival sac after, operation. He always allows the patient to walk from the operating table to his bedroom, and has never seen any disadvantage from this practice. He ties the conjunctival suture before doing a peripheral iridectomy.

In summing up, Meller remarks that the best results by the intracapsular method are so brilliant that, even if the patient's other eye has been operated upon with the best possible success by the extracapsular method, the eye whose cataract was removed within its capsule always has better and clearer vision, while the various optical phenomena produced by the anterior lens capsule and even by the delicate unthickened posterior capsule are entirely absent. It is also true that in the majority of the cases this ideal result is attained, yet it would be a mistake to ignore the fact that by the intracapsular procedure complications occur more frequently than by the usual extracapsular operation. The best achievements are to be balanced against a moderate number of eyes in which the course of healing is complicated and inferior end results are obtained. Even in the hands of the most expert, during the course of the operation, the intended intracapsular operation may prove impossible of execution by virtue of conditions which could not be recognized in advance, and which on the other hand can not be overcome by the skill of the operator, while complications sometimes arise which are not to be charged to the account of inadequate technique and yet which would not have arisen in the customary procedure of extracapsular extraction. If the capsule ruptures prematurely, it may become extremely difficult to complete the operation satisfactorily.

Meller's concluding paragraph on this important subject hardly stamps him as an advocate of intracapsular extraction: "He who with his extracapsular procedure has had the thousandfold experience, even in immature cataract, either of obtaining promptly a clear black pupil or, if some lens remains were left behind, of seeing them disappear in a short time and almost always obtaining the best visual acuity that was possible in the individual case, and who with his extracapsular procedure was rarely compelled to undertake discission for after cataract, displays but little inclination to give up so safe a procedure in favor of a manifestly more risky procedure, even if he does not underestimate the undeniable advantages of the latter. Here also we

may apply the saying that the better is frequently the enemy of the good."

But some ophthalmic surgeons will feel that Meller is unduly wedded to the older method which he has employed throughout most of his professional career; and they will be disposed to agree with Elschnig of Prague (Zeitschrift für Augenheilkunde, 1931, volume 75, page 1) that for all immature cataracts, especially in myopic eyes, intracapsular extraction is enormously superior to every other method; that for mature cataracts it is about equal to the extracapsular method, even apart from the absence of need for secondary operation; and that for hypermature or complicated cataracts it is again far superior to extracapsular extraction.

W. H. Crisp.

INTRA-OCULAR TENSION AND FUNDUS CHANGES IN MYOPIA

The behavior of the intra-ocular pressure during the process of elongation of the eyeball in myopia of different degrees has been a subject for study and comparison by several observers. Since 1911 Heilbrun, by numerous tonometric examinations, detected the existence of hypotony in a great number of myopic eyes, about one-fourth of his cases having a lowered tension, even when the acuity of vision was still good. Later Lacroix, Lagrange, Sainz, and others confirmed these results, finding that even a larger number of cases, about one-third of medium and highly myopic eyes, had a marked degree of hypotony. They also tried to establish whether there was a direct relation between the severity of the fundus lesions and the degree of hypotony, and whether this was more marked when the changes were extensive and progressive.

The mechanism of this lowered tension is still unknown. Some authors ascribe it to the development of chorioretinal lesions, posterior staphyloma, so-called posterior sclerochoroiditis and macular involvement. These changes, by disturbing the nutrition of the vitreous body, produce, at a later stage, the shrinking and softening of its mass with a consequent lowering of tension. Others believe that the stretching of the eyeball is the cause both of the chorioretinal changes and the liquefaction of the vitreous. In some cases the vitreous, lined by the hyaloid membrane, is detached from the retina at the posterior pole on account of the elongation of the globe and the increase in the vitreous cavity.

The distention of the choroid and retina produces a stretching of the vessels of both membranes, which induces changes and later on sclerosis of the choriocapillaris. This leads to impaired nutrition of the membranes. If the myopia increases the large choroidal vessels become also sclerotic, and patches of atrophy develop around the disc, in the macula and in other parts of the fundus.

It has already been established that the chorioretinal changes in so-called "myopic chorioretinitis" are not of an inflammatory nature, but distinctly degenerative or atrophic. In order to emphasize this character the writer has proposed the name of *choroidosis* for all processes in the choroid where degeneration and not inflammation, is the primary cause of lesions. This group includes, besides myopic changes, other vascular degenerations of the choroid which lead to atrophy. Among them, as a typical instance, can be mentioned the form of vascular choroidosis, which has been termed "primary atrophy of the choroid" and may be either partial or diffuse. It is observed in senility, arteriosclerosis, syphilis, and other conditions. The "peripapillary sclerosis of the choroidal vessels" near the disc and the senile macular degenerations are the circumscribed forms of the disease, while the diffuse form corresponds to the so-called "primary choroidal atrophy" of the whole fundus.

As stated above, there is a difference of opinion as to whether myopic choroidosis is the cause of or simply coexists with, the liquefaction of the vitreous and a lowered intra-ocular tension. Furthermore, some other authors, like Lagrange, consider hypotony as a

primitive condition, independent of the fundus lesions and due to systemic diseases of a nervous or vascular origin. The majority of observers, however, believe in the common origin of vitreous changes and uveal or chorioretinal degeneration. Cechetto reported in 1911 several cases of so-called "posterior sclerochoroiditis" with liquefaction of the vitreous and hypotony of 15 or 12 mm. Hg. Recently G. Caso (Lettura Oftalmologica, June, 1931) has again taken up this subject, with the added purpose of determining if there is a direct relation between hypotony and the gravity and extension of myopic chorioretinosis. He studied 100 cases of which 20 were normal for comparison; 22 had a myopia of low degree (less than 7 D.); 14 had a milder error (5 to 9 D.) and 32 were affected with high myopia with fundus changes. He concludes that intra-ocular pressure is usually between normal limits (19 to 20 mm. Hg. as an average) in the lower and medium degrees of myopia, while in the high degrees about two-thirds of the cases have a marked hypotony. Of the 32 patients with high myopia, in 5 only was the tension above 20 mm. while the minimum reached 12 to 13 mm.; the average being 16.8 mm.

The author believes that there is a relation between hypotony and fundus changes, although it is not yet possible to decide if this hypotony is primitive or consecutive to the chorioretinosis. He believes that the more severe the fundus changes, the lower the intra-ocular tension. In 11 cases of anisometropia the pressure was higher in the eye with higher myopia than in the fellow eye.

It should therefore prove of great practical importance to make a systematic survey of the ocular tension in high myopia, as the existence of hypotony will considerably aggravate the prognosis and at the same time will give a warning that serious changes are taking place in the inner membranes. This warning is important even in cases in which the changes are minimum or have escaped the attention of the observer, as sometimes happens. Hypotony according to Caso, is an index of the progress of the disease, and its detection will be of great value both in establishing a suitable treatment and in avoiding other impending dangers such as detachment of the retina.

The question of the relations between hypotony and detachment of the retina is not yet settled. Lagrange believed that although hypotony favors the retinal separation, it is not a sufficient cause *per se*. A rupture of the retina should be necessary to allow the liquid contained in the vitreous to pass underneath and separate the retina. This opinion seems to be substantiated by the findings of several observers who have recently followed Gonin's technique for the operation of detachment of the retina.

Manuel Uribe Troncoso.

THE ROUTINE EXAMINATIONS OF PATIENTS WITH SPECIAL REFERENCE TO THE PHORIAS

Every ophthalmologist has to decide just what tests to include in his routine examination of patients whom he has not seen before. There is a great number of tests that might be made but many of them would be unnecessary and the factor of time consumed is vital to both patient and physician. On the other hand it is essential that no important feature in the case be overlooked.

In the beginning of his practice the physician has usually a superabundance of spare moments and can include many special examinations which later he will drop from the routine.

It may be argued that each case is individual and that no routine handling of patients is ever justifiable. In one sense this is undoubtedly true but it is safe to say that ninety percent of patients come to the ophthalmologist with a complaint of eye strain, headache or poor vision, any combination or all of these and of nothing else. It is for these patients that a routine must

be established when a practice has assumed large proportions.

To attempt to decide for anyone but himself of what this routine should consist would probably result in complete disagreement and the effort to do so would be folly, but about certain of the procedures there can be no question. The taking of a careful history, the meticulous and painstaking refraction by what ever method the practitioner has found most satisfactory in his own hands—what a world of controversy there has been on that subject!—ophthalmoscopic examination and observation by diffuse and oblique illumination, date back to the infancy of ophthalmology and certainly have always been a part of every eye examination that even pretended to be complete, since the discovery of the ophthalmoscope. For many years it may be hazarded that this and little else constituted the routine test of the usual patient.

Soon after the careful work of Donders and others on refraction in the middle sixties of the nineteenth century, attention began to be focused on the extra-ocular muscles. Obviously strabismus had been known and attempts made to cure it since earliest times but it was not until after 1880 that the importance of ocular imbalance, other than strabismus, began to be appreciated. In this country probably the pioneer work of Gould had the greatest influence on the profession. Since then it is safe to say that an increasing amount of thought has been given to this matter. In more recent years the idea of muscle exercises has been exploited—often rather obviously from an unworthy motive by optometrists and those even less well informed—until laymen have heard so much about them that ophthalmologists are frequently asked whether they use this method of treatment. Suffice it to say at this point that examination of the muscle balance has definitely become a part of the ophthalmic routine.

Whenever a man makes a special study of some feature of examination he is apt to become enthusiastic about it. He sees possibilities in it that his less eager confrere overlooks. He picks up pathology that has been missed by others and unsuspected by himself until discovered by use of the procedure in which he is especially interested. If this happens sufficiently often he becomes convinced that this particular test should never be overlooked. An ardent advocate of the slit-lamp thinks that every new case should have a slit-lamp examination. Visual fields taken as a routine will indicate unsuspected lesions once in a while that would otherwise be missed, as will also the routine use of the tonometer.

A beautiful piece of work was shown at the meeting of the American Academy of Ophthalmology and Otolaryngology this fall which would suggest that an occasional cause of asthenopia is difference in the relative size of objects in the two eyes. Possibly here is another test to be added some day to the routine.

No expression of opinion as to what tests should be made a routine will be hazarded here. Even if every patient would tolerate all of those mentioned above and other tests too, there would be few who could afford to pay an adequate compensation for the time which the ophthalmologist or his assistant must spend in making them.

In this number of the Journal there is a discussion of hyperphoria as a cause of ocular discomfort in which it is maintained that hyperphoria should be measured in the six cardinal positions of the eyes as hyperphoria is usually paretic and only by such a method can the suitable prismatic correction be determined; and that a frequent cause of difficulty is the prescribing of prisms which correct a hyperphoria present on looking straight ahead but disappearing when looking down, as in reading, consequently the prismatic correction causes asthenopia in reading by overcorrecting the hyperphoria in this position.

There can be no question about the concomitant nature of hyperphoria and

certainly the measuring of it should be done not only on looking straight ahead but also on looking down, as the prescription will vary according to this finding. A frequent difficulty is that the phoria is different in every position of the eye and consequently prismatic correction is very uncertain. Occasionally the use of a prism in the reading segment different from that in the portion of the glass designed for distance is helpful.

It is important in testing the lateral phorias that some method be used which will be efficacious in separating the convergence associated with accommodation in near testing. The dissociation with prisms is much less complete than that with a multiple Maddox rod before one eye and a small point of light as a fixation object.

Just how much good muscle exercises will do is also a moot point. Most ophthalmologists agree that little or nothing can be done by exercise towards adjusting a hyperphoria but that more or less can be done with the lateral phorias.

There are those who contend that muscle exercises of a general nature are valuable in asthenopia. An interesting instrument was shown at the meeting of the American Ophthalmological Society last spring and again at the American Academy of Ophthalmology and Otolaryngology this fall. Specially constructed discs were made to revolve and were displaced by rotating prisms before the patient's eyes. The demonstrator felt that some of his patients have been much relieved of muscular asthenopia by use of this instrument.

Whatever may be the decision with regard to including in the routine many of the special tests there can scarcely be any doubt about the advisability of including such tests for hyperphoria as are mentioned in the paper under discussion. In this way a better understanding of the lesion can be obtained and consequently a more intelligent method of treatment instituted, even if this be only symptomatic.

Lawrence T. Post.

BOOK NOTICES

Biomicroscopy of the lens in its normal and pathologic states. By C. Duverger and E. Velter. Paper, octavo, 108 pages, illustrated with 36 plates in color. Paris, Masson et Cie, 120, boulevard Saint-Germain, Price 150 fr.

This report, read before the French Society of Ophthalmology, May 13, 1930, constitutes the third volume of an atlas of ocular biomicroscopy. The first two volumes, "Microscopic Examination of Corneal Affections by Means of the Slit-lamp" by Gallemaerts, and "Biomicroscopy of the Anterior Chamber, of the Iris, and of the Ciliary Body" by Mawas, appeared in 1926 and 1928, respectively, and are on sale at Masson et Cie.

The first chapter is devoted to a brief but ample description of the technique of examination of the lens, including instruments, methods of illumination, etc. The second chapter deals with the normal lens, particular attention being given to the study of the optical zones. The third chapter, entitled: "Embryonic Remains", is divided into three subdivisions, anterior remains, posterior remains, and posterior lenticonus. Of these the anterior remains in the forms of isolated stellar-like pigmented deposits on the anterior capsule are described as most frequent. The fourth chapter, congenital cataracts, is subdivided under five headings which are: first, posterior congenital opacities; second, intracrystalline congenital opacities; third, anterior congenital opacities; fourth, zonular cataract; and fifth, complete congenital cataract. Chapter five deals with lens opacities of the adult, chapters six and seven with senile modifications in the lens, and chapter eight with pathologic cataracts.

The subject of traumatic cataract is very ably treated in chapter nine. The authors state that the biomicroscope has made it possible, in light traumatisms of the lens with very mild lesions, to establish from the onset a very

much more precise diagnosis and at the same time a prognosis of considerable reliability as to the future evolution of the lesion. Occasionally it can be the cause of modification of the treatment by enabling the discovery of very minute intracrystalline foreign bodies which would be invisible to other methods of examination. Its clinical value is, therefore, much greater where the initial lesion is small. Chapter ten is concerned with secondary cataracts and chapter eleven with the suspensory apparatus of the lens.

The authors conclude that while the biomicroscope furnishes important, precise, and useful clinical information, it does not create a new lens pathology. It gives old conditions a new appearance, adds some details which had not been seen until its use, and permits accurate prognostication in certain types of lens opacities. It must be constantly used in comparison with other methods of examination to avoid erroneous interpretations. A complete bibliography is appended.

The last part of the volume is made up of 36 plates in color, each plate consisting of from four to seven figures. In addition to the biomicroscopic appearance of the lesion each plate includes the appearance when viewed with oblique illumination and with the plain mirror.

Phillips Thygeson.

Stereoskopischer Atlas der äusseren Erkrankungen des Auges, nach fabigen Photographien by Prof. K. Wessely in Munich. III Vol. Pictures 21-30. Published by J. F. Bergmann, Munich. 1931. Price 12 marks.

This third volume of the Wessely Stereoscopic Atlas in colors appeared after a considerable lapse of time in the same form as its predecessors. The conditions illustrated herein are: Senile Ectropion—Pemphigus of the Conjunctiva—Epithelioma of the Conjunctiva—Interstitial Keratitis—Chemosis and Exophthalmos in Orbital Periostitis—Subconjunctival Lipodermoid—Polykoria—Panophthalmitis—Hydrophthalmos—Sarcoma of the Choroid, broken through. On the back of each plate is a description of the case with short comments of a general or therapeutic nature in German, English, and French. With but few exceptions the pictures are good, particularly those of lower magnification. The color reproduction is very life-like, particularly the pronounced reds and blues, so that the student obtains a very clear idea of the process in vivo. In the teaching of small groups, these stereo photographs are becoming more and more valuable and these Wessely pictures promise to form the nucleus of an important adjunct to the teaching of ophthalmology.

Harry Gradle.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history

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9. CRYSTALLINE LENS

Mawas, J. **Biomicroscopy of black cataract.** Bull, et Mém. Soc. Franç. d'Opht., 1930, p. 3.

Information concerning the frequency, pathogenesis, clinical evolution, and prognosis of black cataract has accumulated only slowly in the past, but thanks to the slit-lamp and corneal microscope it is rapidly becoming more abundant.

Mawas, in a short but complete report, summarizes his findings in three cases studied biomicroscopically. He concludes that black cataract is not a senile cataract which has imbibed pigment, as is commonly believed, but one which has undergone certain changes in its optical properties. One of the physical modifications noted was definite thickening of the adult and embryonic nuclei. When the light beam was passed through the nucleus a remarkable phenomenon was observed, consisting of decomposition of the white light by the nuclei, which appeared bright yellow at the periphery, orange in the first layers, then red, brownish red, and finally brown in the center. It would appear that the lens decomposes the light and absorbs the violet, the blue, and the green. Only the longer wavelengths are reflected.

The lens was found to retain its anatomic integrity and to differ only in modification of some of its physical properties such as index of refraction, volume, consistence, and coloration. Histologic and microspectroscopic studies confirmed the biomicroscopic findings.

In black cataract the lens, owing to a change in its optical properties, then acts as a spectroscope in breaking up white light and returning to the eye of the observer only the yellow, orange, and red radiations, which have not been absorbed. *Phillips Thygeson.*

Morax, V. **Etiology and treatment of glaucoma secondary to extraction of the lens.** Bull. et Mém. Soc. Franç. d'Opht., 1930, p. 84. (See Section 8, Glaucoma and ocular tension.)

Ringelhan, O., and Elschnig, A. **Luxation of the lens.** Arch. f. Augenh., 1931, v. 104, July, pp. 325-398.

Ringelhan and Elschnig have studied the records of all cases of luxation of the lens seen in the Prague Eye Clinic from 1907 to 1930. The very detailed paper does not readily lend itself to abstracting and only a few points of interest can be mentioned.

The authors classify all cases of

luxation of the lens in three groups: (a) luxation due to trauma; (b) luxation following intraocular pathology; (c) congenital luxation. The condition was found in approximately 0.15 percent of the patients of the eye clinic.

The following is a summary of the indications accepted for operation: Where luxation into the vitreous is accompanied by detached retina, surgery is not indicated unless a painful glaucoma or iridocyclitis forces the issue. With long standing glaucoma, cyclodialysis should be tried first or, if the condition is accompanied by iridocyclitis, iridectomy should be done. If these procedures fail, extraction of the lens should be attempted. Extraction should be performed in recent cases in which the tension is increasing. In congenital cases, an interval of several months should intervene before the second eye is operated upon. In monocular subluxation, surgery is indicated if the lens becomes opaque. If both eyes are involved to the extent that the lens is rather freely movable, extraction should be done unless the patient can be carefully watched by a competent oculist as to the possible development of vitreous changes or glaucoma. The same principle applies in cases of luxation into the vitreous. With luxation or subluxation into the anterior chamber and where the edge of the lens is visible in the pupillary area, extraction is indicated. The method of operating is discussed with special reference to congenital luxation and to luxation of the lens into the vitreous.

Frederick C. Cordes.

Saint-Martin, de. **Avoidance of dressings after cataract extraction. Presentation of metallic protective eye shields.** Bull. et Mém. Soc. Franç. d'Opht., 1930, p. 80.

De Saint-Martin is strongly in favor of avoiding dressings after cataract extraction. He presents a protective shield made of copper, which has certain advantages over designs previously presented. The shield is sufficiently rigid to protect the eye from accidental injury but is at the same time light. It is molded to conform to the average orbital margin and can be easily bent to adapt it to the particular case. The upper nasal border has a curved projection which, fitting over the base of the nose, serves to prevent slipping. Absolute fixation is obtained by two crossed adhesive strips. The shield is concave to avoid brushing the lashes and is perforated in several places to allow free circulation of air.

Phillips Thygeson.

Saint-Martin, de. **State of the vitreous after intracapsular cataract extraction. Clinical study.** Bull. et. Mém. Soc. Franç. d'Opht., 1930, p. 73.

De Saint-Martin recalls the often expressed opinion of certain authors that intracapsular extraction provokes grave lesions of the vitreous and favors glaucoma and detachment of the retina. As evidence against this he reports the results of 153 complete extractions, some by the use of Kalt's forceps but the majority with the erisiphake of Barraquer. The resultant visual acuities, measured from two months to three years after operation, grouped themselves as follows: four percent less than 1/10, five percent from 1/10 to 4/10, 17.5 percent from 5/10 to 7/10, and 72.4 percent from 8/10 to 10/10. The five acuities below 1/10 resulted from expulsive hemorrhage in one case, myopic chorioretinal degeneration in one case, and hemianopsia involving the macula, old myopic amblyopia with central scotoma, and multiple hemorrhages of iris and vitreous in one case each. Vitreous was lost thirty-one times in the 153 extractions, and of these seven resulted in visual acuity of from 1/10 to 5/10 and nineteen from 6/10 to 9/10.

Among the 153 extractions there were twenty-three cases of vitreous disturbance, mostly following hemorrhage of the iris or ciliary body, and only one following uveitis. Of these the vitreous exudates were absorbed satisfactorily in all but three cases. Glaucoma occurred in one case and was satisfactorily controlled, the patient having final vision of 8/10. Detachment of the retina also occurred in one case,

probably as a result of choroidal hemorrhage.

Biomicroscopic examination of twenty-eight cases showed the hyaloid normal and perfectly homogeneous in twenty-two and ruptured in six. In eight cases the vitreous remained behind the iris but in thirteen it was herniated through the pupillary opening.

De Saint-Martin concludes that the fears advanced by certain authors are entirely unjustified.

Phillips Thygeson.

Teulières, M., and Beauvieux, J. **The zonule in vertebrates.** Arch. d'Opht., 1931, v. 48, July, p. 465.

A study was made in representatives of all classes of vertebrates, to determine if the comparative morphology of the zonule would furnish a clew as to its function.

From its structure it may be assumed that one of the functions in the zonule in all vertebrates is to support the lens. In the lower vertebrates the zonular fibers tend to be inserted at the equator of the lens. In monkeys the fibers are inserted over an area extending out on to the anterior and posterior surfaces of the lens from the equator, as they are in man. As the eyes of apes are known to possess definite accommodation, this structural variation would seem to have a relation to that function. (One colored plate, nine diagrams.) *M. F. Weymann.*

Vail, D. T. **Adult hereditary anterior megalophthalmos sine glaucoma: a definite disease entity, with special reference to the extraction of cataract.** Arch. of Ophth., 1931, v. 6, July, pp. 39-61. (See Section 8, Glaucoma and ocular tension.)

10. RETINA AND VITREOUS

Bulac, C. O. **The morphology of the neuroglia of the optic nerve and retina according to the methods of the Spanish school (Ramon y Cajal).** Zeit. f. Augenh., 1931, v. 74, June, p. 248.

This long study discusses different methods of making and staining sections of the optic nerve, chiasm, and certain elements of the brain. The author concludes that among the methods devised by Spanish authors that of Del Rio Hortegas is the best. With some modification his method may replace that of other Spaniards. For the examination of the neuroglia this method alone should be used. The methods of the Spanish authors do not solve doubtful problems concerning the structure of the neuroglia. When Del Rio Hortegas' method has been further perfected it should yield valuable results in clarifying the morphology of the neuroglia. The author advises placing a small amount of hydrochloric or acetic acid in the fixing bath when fixation is done in ammonium bromide. The results of the author corroborate those of Marchesani. When the retina was stained by the method of Ramon y Cajal astrocytes were readily found. When the retina was stained according to Del Rio Hortegas, Mueller's supporting fibers were found.

F. H. Haessler.

Chase, L. A. **Diabetic lipemia retinalis; case report.** Jour. Amer. Med. Assoc., 1931, v. 97, July 8, pp. 171.

The thirty-seventh reported case of diabetic lipemia retinalis is here given. The retinal condition disappeared in seven days on insulin, when the blood lipids were between 1.42 and 1.13 per cent in the whole blood. This figure is much lower than that reported by Gray and Root, Wagener, and others. Chase feels that one cannot become dogmatic about these threshold figures until in a large number of cases daily blood lipids are compared with daily examinations of the retina. In the present case thirty-seven analyses of blood for total lipids, total fatty acids, and cholesterol were made. The blood lipids became normal in thirty-six days; the total fatty acids and total lipids dropped rapidly; the cholesterol dropped slowly and showed fewer daily fluctuations. Chase feels that lipemia does not necessarily justify a poor prognosis; insulin has changed for the better all prognoses in diabetes. The author's first patient with lipemia

is still alive four years after severe lipemia, is taking less insulin and more carbohydrate all the time, and is working every day. The patient in the case here reported is now, one year later, fifty-two pounds heavier than on admission, and is sugar free on twenty units of insulin daily.

George H. Stine.

Doherty, W. B., and Trubek, M. **Significant hemorrhagic retinal lesions in bacterial endocarditis (Roth's spots).** Jour. Amer. Med. Assoc., 1931, v. 97, Aug. 1, pp. 308.

In bacterial endocarditides, acute and subacute, and in the severe anemias, notably pernicious anemia, the occurrence and discovery of characteristic superficial elliptic retinal hemorrhages with white centers may aid in early diagnosis. The lesion occurs in both eyes, with a little greater frequency in the left eye in the authors' series. It was found that the lesion has little prognostic value in subacute bacterial endocarditis; in several instances it had appeared and disappeared in successive crops many months before death. Pathologic material was obtained in three cases which during the patients' lives were diagnosed as subacute bacterial endocarditis, acute bacterial endocarditis, and pernicious anemia, respectively. All these cases showed retinal lesions immediately before death. One of the most interesting observations was the fact that the lesion was limited almost wholly to the most superficial layers of the retina, the choroid showing practically no involvement; this distinguishing the condition from septic and metastatic choroiditis. The authors suggest that the designation "endocarditic retinitis" might after further study be appropriately applied. (Six figures of the ophthalmoscopic and microscopic appearances of the lesions are given.)

George H. Stine.

Farid Bey, N. **Embolism of the arteria centralis retinæ.** Brit. Jour. Ophth., 1931, v. 15, Aug., p. 467.

The author offers a comparative study with a case of central artery spasm reported one year ago. He points out as to the symptomatology of the two conditions that in embolism loss of sight is sudden and complete and the vessel degeneration is more pronounced. In spasm, the sclerosis being gradual, the blindness appears periodically in transitory attacks. The case now reported was probably due to parietal thrombosis of the atheromatous aorta. *D. F. Harbridge.*

Gonin, J. **Relapses and recurrences of retinal detachment.** Arch. d'Opht., 1931, v. 48, July, p. 487.

Distinction is made between a relapse (rechute) and a recurrence (récidive), occurring after treatment of retinal detachment by ignipuncture. Relapses occur within fifteen days to three weeks and are usually due to improper localization of the tear or to formation of a new one. The prognosis is not bad, as further intervention may correct the difficulty. Recurrences occur in about one out of eight cases, and it is difficult to say whether they are due to the cicatrices formed or to the diseased state of the eye which led to the first detachment. Early recurrences may be due to excessively severe operative intervention, but late recurrences may well be thought to be due to further degenerative changes in an eye already diseased. Cases which have had multiple punctures and which have been followed over a period of years have remained cured, so that the operative scar tissue does not necessarily lead to further detachments.

M. F. Weymann.

Guist, Gustav. **A new operation for retinal detachment.** Zeit. f. Augenh., 1931, v. 74, June, p. 232.

To produce a fibrinous exudate with which to cause reattachment of the retina without injuring this membrane, the author has substituted potassium hydrate for actual cautery. After experiments on animals he tried his method on a human eye. Five weeks later the patient read Jaeger 1 and had a visual acuity of 6/9, with normal form and

color fields. After localizing the hole in the retina Guist cauterizes the choroid by applying a pointed stick of potassium hydroxide for two minutes through a 1.5 mm. trephine opening. If more than one retinal hole is present a trephine opening is made for each. The excess of hydroxide is immediately neutralized with 0.5 percent acetic acid, and after stopping all bleeding the subretinal space is opened by bluntly puncturing the choroid with a conical sound. The operation accomplishes the same result as Gonin's and is much less dangerous. *F. H. Haessler.*

Junius, Paul. **Exudative retinitis with vascular changes.** Klin. M. f. Augenh., 1931, v. 86, May, p. 577 (ill.).

Referring to a unique case of exudative retinitis without vascular changes recently reported by Kalt, Junius gives the detailed clinical history of a man aged forty-two years, with changes of the inferior and superior temporal retinal arteries as far as the capillaries, and later also of the inferior temporal retinal vein. The patient, who had had excellent sight, complained of visual disturbances in his right eye. At examination four weeks later vision was 0.5 and there was a small relative paracentral scotoma, with capillary hemorrhages at the macula and a half stellate figure, as well as large exudations, partly of the shape of retinitis circinata. Another similar case with disciform degeneration of the center of the retina also showed changes of the inferior temporal retinal artery. The anamnesis in the first patient disclosed that he had had diphtheria eight years previously. He regained normal vision and the ophthalmoscopic changes mostly subsided. In both cases the affection of the bloodvessels was considered as the primary process. *C. Zimmermann.*

Luntz, G. **Concerning the action of perforating cauterization on the eyes of animals.** Zeit. f. Augenh., 1931, v. 73, March, p. 380.

This short report discusses results obtained by perforating the eyes of six rabbits and one monkey with the galvanocautery and studying the histological sections five to twenty-two days after injury. The results show that the healthy animal's eye suffers no extensive destruction from cauterization. There is necrosis of the sclera at the point of perforation, local injury to the choroid, and atrophy with thinning of the retina. Whether white or red heat was used made no apparent difference, nor did the duration of cauterization make much difference. The most important finding is that the retina shows a much greater degree of injury than the choroid and is changed into a thin structure consisting of one or two rows of cells. *F. H. Haessler.*

Marchesani, O., and Wirz, F. **Pigmentary degeneration of the retina associated with pseudoxanthoma elasticum.** Arch. f. Augenh., 1931, v. 104, July, pp. 522-545.

Marchesani and Wirz feel they have discovered a pigmentary degeneration of the retina associated with pseudoxanthoma elasticum. The degeneration somewhat resembles angioid streaks. Four cases are reported.

Frederick C. Cordes.

Meisner, W. **The origin of a macular coloboma.** Zeit. f. Augenh., 1931, v. 73, March, p. 333.

In a child with a typical coloboma at the macula, with internal strabismus, the subsequent course made it perfectly clear that the macular lesion was the end result of a tuberculous inflammation in the choroid. Several attacks of tubercle of the choroid occurred, and in one of them a tubercle was situated at the edge of the area which had been diagnosed as a coloboma.

F. H. Haessler.

Pallarés, J. **Neurofibrillitis tuberculosa retinæ. (Retinochoroiditis juxtapapillaris of Jensen.)** Klin. M. f. Augenh., 1931, v. 86, May, p. 598 (ill.).

A man aged twenty-three years, three weeks after la grippe followed by cough and general weakness, had foggy vision in his right eye. At the upper

temporal margin of the disc was a cottonlike oval poorly defined opacity 1.5 disc diameters long, 1 wide, with its axis upward and outward, apparently of slightly uneven prominence. The smallest vessels under it were not visible and the upper temporal retinal vein was veiled by it. In red-free light the patch showed a fibrillary arrangement. The fibers were irregular and tortuous, located in the inner stratum, and the author considers the affection as a neurofibrillitis of the retina. An absolute semicircular scotoma corresponded to it. As the anamnesis spoke for tuberculosis, the patient was treated with tuberculin injections, and after four weeks retina and disc were of normal appearance and the scotoma reduced to a point. *C. Zimmermann.*

Rados, Andrew. **Lymphorrhagia retinæ traumatica.** Arch. of Ophth., 1931, v. 6, July, pp. 93-103.

The condition from which this paper takes its title was first described by Purtscher, following serious concussions. Only a few cases have been reported. The author adds one more to this number. The picture is characterized by isolated, occasionally confluent, white patches in the inner layers of the retina, probably covering the retinal vessels. These spots are arranged along the course of the large vessels, especially in the region about the papilla and the macula. There are also punctate and ribbon-like retinal and preretinal hemorrhages, which tend to disappear rapidly. These white spots disappear without leaving a trace, except occasionally small hemorrhage. There is no permanent loss of vision, though the disc is occasionally somewhat pale. Now and then paracentral, crescent-shaped scotomas remain as a permanent disturbance. It will be noted that the location of the white spots lying near the large retinal veins is also in the region of the perilymphatic spaces. This, in connection with the fact that the spots have been known to appear in twenty-four hours, leads to the conclusion that they are due to an escape of lymphatic fluid through traumatic disturbance in the walls of the lymphatic channels. *M. H. Post.*

Rossi, V. **Familial retinal macular degenerations associated with calcifications of the meningeal dura and epiphysis.** Arch. di Ottal., 1931, v. 38, March, p. 97.

The author reports cases, with detailed description of the macular condition, fundus pictures, and x-ray plates showing calcification of the meningeal dura and pineal gland. The histopathologic reports show that the ganglionic layer is primarily involved. Various theories are mentioned, including that of abiotrophy by Treacher Collins. Most clinicians agree that in these cases of retinal degeneration we have a recessive hereditary transmission, accompanied oftentimes by genital dysfunction and hypoplasia. The calcification of the pineal gland and dura mater are considered by many authors as purely incidental. However, these lesions are always the expression of a state of endocrine dysfunction, particularly as regards glands of the sexual sphere. Most French clinicians believe that the meningeal ossification should be considered as a postinflammatory phenomenon (pachymeningitis). Syphilis and hereditary lues to the third generation, with negative Wassermann, are given as causes of this morbid ocular syndrome with familial type, in which degenerative symptoms are associated with inflammatory characteristics. *David Alperin.*

Schwarz. **Embolism of central retinal artery after extirpation of an ovary with abscess formation of the corpus luteum.** Bratislavske Lekarske Listy, 1931, v. 12, April, p. 180.

A woman aged thirty-eight years was subjected to an artificial abortion in the second month of pregnancy, because of an inflammatory tumor which at operation proved to be an abscess of a corpus luteum. On the twenty-second day after operation complete amaurosis of the left eye suddenly developed as a result of embolism of the central retinal artery, probably second-

ary to endocarditic changes. A certain amount of visual power was shortly re-established as a consequence of collateral circulation from a cilioretinal artery.

Tutui, Y. **Effect of cutaneous stimulation upon retinal pigment migration in unilateral resection of the sympathetic.** Arch. f. Augenh., 1931, v. 104, July, pp. 451-463.

Tutui experimented as to the influence of various skin stimulants on retinal pigment migration in frogs in whom one sympathetic had been severed. He was unable to demonstrate any alteration of the retinal cones or pigment cells. *Frederick C. Cordes.*

Veil, P., and Dollfus, M. **Treatment of detachment of the retina by Gonin's obliterating thermopuncture.** Arch. d'Opht., 1931, v. 48, June, p. 403.

The literature concerning tears in the retina associated with detachment is reviewed. Of seventeen cases of detachment examined, tears were found in thirteen. After finding the tear it was localized by the method of marking a meridian and estimating the distance from the ora serrata. The thermocautery was preferred to the galvanocautery. The case reports of eleven patients operated upon are given in detail, with charts of visual fields. Seventeen thermopunctures were done on eleven detachments by the writers. One case has remained cured for five months, another for three months, and a third for one month. Three others have been somewhat improved but one case of two months duration completely failed of its object. Four of the cases were still under treatment.

In view of the large number of cases already reported as treated by this method, this paper might have been more valuable if the writers had waited until the apparently favorable cases had been observed over a longer period of time before reporting them.

M. F. Weymann.

Vito, Pietro. **Clinical considerations on a case of typical bilateral circinate retinitis.** Arch. di Ottal., 1931, v. 38, April, p. 180.

While the etiology of retinitis circinata is as yet uncertain, it is believed to be oftentimes accompanied by tuberculosis, diabetes, arthritis, gout, Bright's disease, and so on. On autopsy the retina was found to have undergone hyalin and fatty degeneration of the granular layer, with degeneration of the pigment epithelium, and some glial cells. The pathology is limited to the macular and permacular region, giving a scotoma of about 10 to 20 degrees, and leaving the rest of the retina more or less intact. The article contains various theories as to etiology, and an extensive bibliography on the subject. *David Alperin.*

Weymann, M. F. **Hyaloid remnants as a source of scotomas.** Arch. of Ophth., 1931, v. 6, July, pp. 79-80.

Vogt demonstrated that by biomicroscopy every eye showed some remnants of the hyaloid artery. Two cases are cited in which the author was able to describe accurately the scotoma, and to reassure the patients with regard to its innocuousness. *M. H. Post.*

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Alpers, B. J., and Wolman, I. J. **Arteriosclerotic disease of the optic nerve.** Arch. of Ophth., 1931, v. 6, July, pp. 21-31.

A woman of forty-four years had essential hypertension and slight aortic insufficiency. The right disc was swollen and slightly blurred. There was a star-shaped exudate in the macula. The vessels were sclerotic. The left eye showed no abnormality other than sclerotic vessels. There was a faint trace of albumen in the urine. Three years later the discs were flat and well defined, the arteries small. The Wassermann and Kahn tests were negative. At autopsy there was found intense arteriosclerosis, involving the entire circle of Willis and the vertebral arteries. The vessel walls were markedly calcified. Both optic nerves were definitely compressed by the internal carotid

arteries, which lay close to the optic nerves. There was no degeneration of the axis cylinders or myelin sheaths. The vessels within the nerves showed marked sclerosis on microscopic examination. In the nerve tissue were found focal infiltrations composed of small lymphocytes, fibroblasts and macrophages, probably the result of irritation.

Obscure cases of optic atrophy may, therefore, be tentatively ascribed to arteriosclerosis, bearing in mind that arteriosclerotic changes are not usually found alone in the region of the optic nerves. *M. H. Post.*

Aurand, L. **Partial rupture of the optic nerve by contusion of the globe.** Ann. d'Ocul., 1931, v. 168, June, pp. 431-437.

A thirty-four-year-old man was suddenly struck by a flying piece of wood in the lower temporal region of the left eye. The pupil was dilated and fixed, and vision was greatly lowered. There were vitreous floaters, retinal hemorrhages, a choroidal tear, and changes in the disc suggesting rupture, with displacement of the large vessels. One month later there was a cupping of the disc in the lower temporal region 3 mm. deep and involving about one-third of the area of the disc. In five months the cup involved about two-thirds of the disc. The tangential entrance of the nerve into the globe and the probable rotating effect on the globe of the injury explain the site of the partial rupture. *H. Rommel Hildreth.*

Beer, Leon. **A case of transient quinine blindness.** Zeit. f. Augenh., 1931, April, v. 74, p. 50.

A thirty-year-old woman took fifteen grams of quinine by mistake. The clinical course of the resulting poisoning was typical. Vision returned to 6/15 in one eye and to ability to count fingers at two meters in the other.
F. H. Haessler.

Cucchia, A. **Researches on visual acuity and affections of the optic nerve.** Ann. di Ottal., 1931, v. 59, Feb., p. 130.

(See Section 3, Physiologic optics, refraction, and color vision.)

De Grosz, E. **Neurosurgical aspects of sinus thrombosis from the standpoint of ophthalmology.** Surgery Gynec. and Obstet., 1931, v. 52, Feb., p. 471.

Although this article is entitled "neurosurgical aspects of sinus thrombosis," the author devotes most of the space to discussing and urging early decompression in cases of brain tumor in which choking of the disc is present.
M. E. Marcove.

Jaeger, Ernest. **Grippe and optic neuritis.** Klin. M. f. Augenh., 1931, v. 86, June, p. 812.

Three cases of grippe, which after from ten to fourteen days had apparently entirely subsided, were followed a few weeks later by acute toxic optic neuritis with great impairment of sight. The prognosis was good, and urotropin in the form of intravenous injections of 5 c.c. cylotropin was therapeutically effectual. *C. Zimmermann.*

Jaensch, P. A. **Circumscribed depression in the optic nerve head with negative ophthalmoscopic picture.** Zeit. f. Augenh., 1931, v. 74, May, p. 163.

In an eye with no abnormality ophthalmoscopically visible at the disc, and enucleated because of choroidal sarcoma, an abnormality of the nerve was found. On the nasal side of the disc was a deep outpocketing of retinal tissue whose walls consisted partly of lamina cribrosa and partly of the pial sheath of the optic nerve. Only the fiber layer dipped into this pocket. Other layers are normal. *F. H. Haessler.*

Landegger, Georg. **Early luetic atrophy of the optic nerve.** Zeit. f. Augenh., 1931, April, v. 74, p. 29.

A patient who acquired lues in February, 1930, became afflicted with a severe luetic meningitis in May of the same year. Contrary to the usual experience he recovered from the malady but bilateral optic atrophy was noted six months after the primary lesion.
F. H. Haessler.

Proppe, Albin. **Myelinization in the rabbit's eye.** Zeit. f. Augenh., 1931, April, v. 74, p. 54.

The question whether the presence of fat cells is normal or abnormal in myelinization is of some practical importance in connection with the congenital interstitial encephalitis of Virchow. The author reviews the voluminous literature on eight pages of fine print. He himself examined gelatine sections of eyes of a series of rabbits from one to nineteen days old. Despite the undoubted progress of myelinization he was unable to find a single fat cell. This finding is in harmony with those of authors who studied the tissue of many other species of animals. Of course it does not necessarily follow that in man also myelinization takes place without the presence of the fat cells, but this is extremely probable.

F. H. Haessler.

Rehsteiner, Karl. **The first anatomical examination of a case of familial hereditary optic atrophy (Leber's disease).** Graefe's Arch., 1930, v. 125, p. 14.

At thirty-nine years of age a man who previously had had good vision developed in each field a scotoma extending from the blind spot to the point of fixation. In the succeeding months the scotoma involved the fixation spot and enlarged further, allowing preservation of the periphery of the visual fields. After some time the ophthalmoscopic picture presented a greenish-white sharply circumscribed papilla, with slightly attenuated retinal vessels. The patient's four brothers, two brothers of his mother, two sons of his mother's sister, and two sons of his maternal grandmother's sister, had all had hereditary optic atrophy; but none of the transmitting females, including an only sister of the patient himself, had been attacked. When forty-seven years old the man died of apoplexy. Anatomical examination of the eyeballs and optic nerves removed at autopsy presented a pronounced atrophy of the nerve-fiber and ganglion-cell layers of the retina. In the cross section of the optic nerve, while some parts were very atrophic other parts were normal. The atrophy involved the temporal side of the nerve anteriorly and the central part of the nerve posteriorly, thus showing an implication of the papillomacular bundle. No inflammatory changes were present. Because there was an atrophy of the fine connective tissue septa of the nerve unlike the condition in a post-neuritic atrophy but resembling that of a primary toxic degeneration, the conclusion is drawn that in the early stage also there had been no inflammation and that Leber's disease is a hereditary primary degeneration of parts of the retina and of the optic nerve.

H. D. Lamb.

Rollet, Jacques. **Optic atrophy due to thoracic compression.** Arch d'Opht., 1931, v. 48, June, p. 434.

A man aged twenty-two years received a crushing injury of the thorax after which he lost consciousness, became cyanotic, and had exophthalmos. After regaining consciousness he was totally blind for three hours. Ophthalmoscopic examination five days later showed no lesion of either fundus. The vision in the left eye was 1/10 and in the right eye zero. Three months later the left eye remained blind with atrophy of the nerve and the right eye showed partial atrophy with visual acuity of 1/4.

Ten cases of this sort are reported in the literature. The exact mechanism of the ocular injury is unknown. It is likely that the increased intrathoracic pressure forces blood back through the jugular veins, producing temporary stasis of the intraocular circulation and hemorrhages into the retina and optic nerve. These latter may be severe enough to cause atrophy. It is also conceivable that the arrest of circulation may be of sufficient duration to cause irreparable damage to the delicate ganglion cells in the retina.

M. F. Weymann.

Tänäsesen, J., and Lazarescu, D. **Brain abscess after skull injury and papillitis.** Klin. M. f. Augenh., 1931, v. 87, July, p. 108.

A boy aged fifteen years had fallen from a horse six weeks previously and had sustained a fracture of the skull with suppurating wound in the left parietal region, followed by right-sided hemiparesis, violent headache, vomiting, obscurations and impairment of vision, and choked discs. After ten weeks, although the wound of the skull was closed and the cerebrospinal pressure was not increased, the papillitis had become more intense and greater on the injured side, with deterioration of vision and contraction of the visual fields, which indicated the necessity for operation. A sequestrum was extracted, which had penetrated the dura mater, the wound was enlarged, and 150 c.c. of pus containing streptococci was evacuated. The patient made a good recovery, and six months later vision, visual fields, and fundi were normal.

C. Zimmermann.

Terrien, Félix. **Hemorrhages into the optic nerve.** Rev. Oto-Neuro-Oftal. y de Cirug. Neurol., v. 6, no. 4, p. 135.

A case is reported in which after a fall on the left temporal region the man remained unconscious for three days. Later all the usual symptoms of cerebral compression were present. Lumbar puncture produced a clear liquid without blood cells, and showing no increase in pressure. But this puncture relieved the headache, and the vomiting ceased next day. There were no other eye or ear disturbances, the vision was normal, and field remained unchanged for both form and colors.

The right fundus was normal, while the left showed well marked peripapillary edema, veins engorged and tortuous, arteries small, and the entire disc surrounded by a areola of hemorrhages. A month later the edema and hemorrhages had decreased considerably, and the vision remained normal. This picture was regarded as due to hemorrhages into the substance of the nerve, subsequent to the head injury.

A. G. Wilde.

Woods, A. C., and Rowland, W. M. **An etiologic study of a series of optic neuropathies.** Jour. Amer. Med. Assoc., 1931, v. 97, Aug. 8, p. 375.

A series of one hundred thirty-eight patients presenting optic neuropathies, most of whom were admitted to the wards of the Johns Hopkins Hospital in various services, is presented. Of these cases, 27.7 percent were due to actual intracranial tumor; 5.1 percent to pseudotumor; 17.7 percent to syphilis; 10.9 percent to arteriosclerosis; 8.1 percent to posterior nasal sinus disease; 6.5 percent to miscellaneous focal infections, 4.4 percent to toxic amblyopia; and 9.1 percent to other miscellaneous conditions; while in 8.1 percent the exact etiologic factors could not be determined.

The preponderance of optic neuropathies due to intracranial tumors in this series is a reflection of the large neurosurgical service of the Johns Hopkins Hospital, while the smaller number of cases due to syphilis is likewise a reflection of the fact that by far the greater number of syphilitic patients are ambulant patients treated in the outpatient department, and do not as a rule enter the wards of the hospital, except for some complicating condition. The figures in the retrobulbar neuritis-papillomacular bundle atrophy syndrome are probably a fairly accurate reflection of the actual condition.

The need of more exact nomenclature in the various optic neuropathies is emphasized. Throughout the paper, the term "papilledema" is used to indicate an edema of the optic papilla, irrespective of whether it may be due to inflammation of the nerve or to increased intracranial pressure. The term "optic neuritis" is used to designate cases of papilledema in which further study indicated that the papilledema was due to an actual inflammation of the nerve. The term "choked disc" is used in those cases in which study indicated that papilledema was due to increased intracranial pressure.

George H. Stine.

Worms. **Ocular and auricular disturbances in oxycephaly.** French Oto-Neuro-Ophth. Soc., 1930, June; in Riv.

Oto-Neuro-Oft., 1930, v. 7, Sept.-Dec., p. 484.

By his radiographic work the author demonstrates the frequency of cranial asymmetries in oxycephaly. Especially evident are: narrowing of the optic canal, which explains the ocular disturbances due to compression of the optic nerve; aplasia of the petromastoid mass, which makes clear the genesis of disturbances of the seventh nerve; contraction of the orbital cavities, which is the cause of the exophthalmos and of the anomalies of the frontal sinuses. As a cause of these cranial deformities the author assumes a process of intracranial hypertension and a dystrophy of the bones of the skull, which are then distended and deformed by the intracranial contents.

Melchiore Lombardo.

12. VISUAL TRACTS AND CENTERS

Gaudissart and Laruelle. **Graefe's sign as a symptom of cerebral localization.** French Oto-Neuro-Ophth. Soc., 1930, June; in Riv. Oto-Neuro-Oft., 1930, v. 7, Sept.-Dec., p. 482.

A case of cerebral tumor showed choked disc, Graefe's sign, paralysis of elevation, spontaneous abnormal movement of the trunk neck and head either while walking or when trying to straighten the trunk. The authors are of opinion that these symptoms speak for a diencephalo-mesencephalic lesion, some elements of the extrapyramidal system being affected.

Melchiore Lombardo.

Holloway, T. B. **Certain pathological conditions about the chiasm: with special reference to pituitary adenomas.** Arch. of Ophth., 1931, v. 6, July, pp. 81-92.

The author first discusses certain pathological variations in the anatomy of the region. Choked disc is the most frequent disturbance of the disc associated with them. In all cases of tumor about the chiasm, the primary symptoms are headache and failing vision. Unfortunately, histories taken by ophthalmologists are apt to be scant and important observations are overlooked. Considerable opposition to detailed neurological, roentgen, rhinologic, and laboratory examinations is experienced. As a result, most of these cases come to the neurological surgeon in a far advanced stage. The headaches are usually frontal in character. In 33 percent of the cases in the author's series, the visual disturbances preceded the headaches. The average age of the author's cases was thirty-four years.

In adenoma, primary optic atrophy is the usual change, that is in 77.4 percent. In 6.5 percent there was early choking, while in 16.1 percent the discs were normal on first examination, though the vision was somewhat reduced, a rather high average for the latter as compared with other statistics, in which they usually occur somewhat less frequently than papilledema. In the author's series, the next most frequent condition, homonymous hemianopia, was present in 16.1 percent as against 54.8 percent with the former condition. *M. H. Post.*

Lutz, Anton. **Nine more cases of binasal hemianopsia.** Graefe's Arch., 1930, v. 125, p. 102.

A comparative summary of nine more cases of binasal hemianopsia from the literature confirms earlier findings. Binasal hemianopsia chiefly occurs in males, and in the best years of life. The patients' histories are characterized by pronounced lack of other accompanying symptoms. Only systematic examination of the visual fields will disclose the presence of a binasal hemianopsia. Its presence when accompanied by the picture of increase of intracranial pressure will first lead us to think of a tumor of the brain ventricle or its wall, or of one situated subtentorially, unless a trauma, the presence of fever, manifest signs of lues, or severe vascular changes indicate another explanation.

In a case, seen by the author, with hydrocephalus from hereditary syphillis, optic atrophy and binasal hemianopsia remained at practically the same stage for twelve years. In spite of the fact that the visual field for the right

eye was contracted to a small segment on the temporal side, never less than thirty degrees from the point of fixation, there was normal pupillary reaction to light in this eye. There does not therefore necessarily exist a central pupillomotor zone in the retina which alone can produce the reaction to light. Light falling upon the periphery of the functioning retina can produce both direct as well as consensual light reflex.

H. D. Lamb.

Mazal, Vladimir. **Therapy of pituitary tumor.** Oft. Sbornik, 1930, v. 5, pp. 157-162.

Twenty-three cases of pituitary tumor were treated at the Brunner clinic. Eighteen were irradiated, 12 of these being improved, while 2 remained unchanged, and in 4 the condition was exacerbated (in 2 cases the improvement was only transitory). Two patients were operated on, one of them being improved, while in the other vision undoubtedly deteriorated. The three remaining patients were not subjected to either of the methods of treatment mentioned. Although the majority of cases respond favorably to irradiation, and Roentgen therapy is without danger in the hands of specialists, cystic tumors and the group of malignant tumors which lead to rapid diminution of sharpness of vision and to acute symptoms of increased intraocular pressure must be passed on to the surgeon. *G. D. Theobald.*

Van Gehuchten. **A case of lateral paralysis due to a lesion of the pons. Contribution to the study of the oculogyral pathways.** French Oto-Neuro-Ophth. Soc., 1930, June; in Riv. Oto-Neuro-Oft., 1930, v. 7, Sept.-Dec., p. 483.

The author studied a case of conjugate lateral paralysis from the clinical and anatomopathologic standpoints. By serial sections he could study the lesions which affected the posterior longitudinal tract. He states that in lateral movement the oculomotor nuclei are synergetically stimulated by a center situated near the external oculomotor center. This center would regulate tonic innervation of the sixth nerve of the same side and the third of the opposite side. The relations with the third would be established by the homolateral posterior longitudinal tract first, and then by the median section of the posterior longitudinal tract of the other side. In animals a lesion at any level of the vestibular nerve causes a deviation of the head and the eyes toward the affected side. In human beings only a lesion of the internal section of the vestibular nuclei causes a deviation and this only to the side opposite to the lesion. It is probable that in this patient the main action was sustained by the oculogyral pathways deriving from the cortex or the subcortical centers, which neutralize the influence of the vestibular system to such an extent that a lesion of the oculogyral center gives an effect opposite to that from the primary vestibular action. *Melchiore Lombardo.*

13. EYEBALL AND ORBIT

Dick, Noble. **Method of enucleation of eyeball.** Northwest Med. Jour., 1931, v. 30, May, p. 236.

The author uses the ordinary tonsil snare to sever the optic nerve after the muscles and fibrous tissue are freed from the globe. By this means the globe can be quickly removed from the orbit with a minimum amount of hemorrhage. The amount of optic nerve removed depends upon the downward pressure of the snare.

M. E. Marcove.

Eemann. **Thrombophlebitis of the cavernous and intercavernous sinuses as complication of tonsillar abscess and orbital thrombophlebitis.** French Oto-Neuro-Ophth. Soc., 1930, June, in Riv. Oto-Neuro-Oft., 1930, v. 7, Sept.-Dec., p. 485.

Three days after the opening of a peritonsillar abscess the patient had a violent occipital pain, rachialgia, Kernig sign, and exaggerated cutaneous reflexes. Two days later bilateral exophthalmos appeared, with chemosis. The veins of the lids became engorged and

all the lids showed a bluish discoloration. The discs were normal but the retinal veins were dilated. The patient died ten days after the beginning of the disease. *Melchiore Lombardo.*

Margotta, Giuseppe. **Clinical researches on a case of typical coloboma of iris, choroid, and optic nerve margin.** Arch. di Ottal, 1931, v. 38, March, p. 132, and April, p. 145.

The author studied the relative visual field, the values of indirect visual acuity, and the light sense. He mentions the clinical characteristics and various theories of its pathogenesis. He noticed in this case a deficiency of the retinal periphery as to these functions, although the macular region was well preserved. He suggests a concomitant phlogistic cause of infective or toxic nature in intrauterine life to explain the defective closure of the fetal fissure, and at the same time the symptomatology with respect to the sensorial apparatus of the eye.

David Alperin.

Margotta, G. **Melanosarcoma of the choroid in an atrophic bulbus with ossification.** (Plates.) Ann. di Ottal., 1931, v. 59, May, p. 416. (See Section 15, Tumors.)

Moorhead, T. G. **Unilateral exophthalmos following administration of thyroid extract.** Brit. Med. Jour., 1931, Mar. 14, p. 442.

A case is presented in which unilateral exophthalmos, tachycardia, tremor, nervousness, insomnia, and loss of weight resulted from taking thyroid extract by mouth. For over a year 12.5 grains of thyroid extract was taken daily for myxedema. The thyroid gland was not enlarged, the nose and throat examination was negative, and the x-ray examination revealed nothing abnormal. Upon withdrawal of the drug the general symptoms subsided and the exophthalmos diminished.

M. E. Marcove.

Rifat, A. **A new case of syphilitic bilateral microphthalmos complicated by other ocular malformations.** Ann. d'Ocul., 1931, v. 168, June, pp. 442-445.

The patient was a man aged thirty years with general physical evidence and a family history of congenital syphilis. On the right side there was a small blind eye placed between underdeveloped lids. The left eye saw fingers at 2.5 meters. It was about half normal size, elongated anteroposteriorly. There was a convergent strabismus and horizontal nystagmus. At nine o'clock there was adherent leucoma. The iris was atrophic, with an ectopic pupil up and out. The lens was normal. No view of the fundus was possible. The author explains the maldevelopment on the basis of intrauterine inflammation. *H. Rommel Hildreth.*

Triossi, S. **A case of giant mucocele of the frontal sinus.** Riv. Oto-Neuro-Oft., 1931, v. 8, Jan.-Feb., pp. 63-76.

(See American Journal of Ophthalmology, 1930, v. 13, March, p. 278.)

14. EYELIDS AND LACRIMAL APPARATUS

Adamantiadis, B. **Operations of choice in trichiasis.** Rev. Internat. du Trachôme, 1931, v. 8, July, p. 140.

Adamantiadis describes three operations which he believes will suffice in the treatment of all types of trichiasis. These are first the operation of Panas, second partial tarsectomy (Snellen's operation), and third the mucous graft (operation of Van Millingen). The operation of Panas is employed only in cases where the tarsus presents no considerable thickening. Partial tarsectomy is employed in the majority of cases, since most of them show tarsal deformation. The mucous graft is applied in cases of recurrence of the trichiasis, where the tarsus is already short and a new excision or even incision might provoke lagophthalmos.

Phillips Thygeson.

Csapody, J. **Relaxation of the medial palpebral ligament, blepharophimosis medialis.** Klin. M. f. Augenh., 1931, v. 86, June, p. 789 (ill.).

In a man aged seventy years, with bilateral medial blepharophimosis, shifting of the medial angle of the lids to the margin of the cornea was caused by stretching of the medial palpebral ligament, in consequence of permanent blepharospasm. It also produced eversion of the lower lid. By shortening the ligament (medial canthifixation), the normal position of the lid border was restored and the cosmetic defect removed. Five mm. of the ligament was abscinded from the crista and the remaining 4 mm. was sewed on the periosteum of the crista. *C. Zimmermann.*

Fazakas, Alexander. **Contribution to the anatomy and mechanism of the lacrimal sac.** Klin. M. f. Augenh., 1931, v. 87, July, p. 73.

For years Fazakas has been occupied with investigations on the physiology of the conduction of tears. His information is derived from observations during operation, analysis of fistulous cases, roentgen and manometer tests, and macroscopic and microscopic anatomical studies. He gives his theoretical views on the mechanism of tear conduction, and shows how with manometer and roentgenograph it may be ascertained whether the lacrimal sac functions or not, which is of great value with regard to choice of the best operative procedure. *C. Zimmermann.*

Gomez Marquez. **Experiences gained from 517 dacryocystorhinostomies.** Klin. M. f. Augenh., 1931, v. 86, May, p. 620 (ill.).

The technique is described in detail. Although this is a difficult operation success is frequently obtained by great care and expenditure of time. A great drawback is uncontrollable hemorrhage. The author, however, thinks that every ophthalmologist has the moral duty to perform the operation to the benefit of his patients. He had good results in ninety-eight percent and thinks there is no procedure for removing obliteration of the tear passages which yields better results.

C. Zimmermann.

Hauer, Karl. **Contribution to the etiology of hypofunction of the lacrimal gland.** Klin. M. f. Augenh., 1931, v. 87, July, p. 79.

A woman aged twenty-eight years had had normal menstruation from her fourteenth year and normal labors in her twentieth and twenty-first years. From the age of twenty-two years, when her father died, she noticed that she could no longer cry. The upper lid covered the upper half of the cornea and the lower lid the lower third, the borders of the lids were red, the conjunctiva hyperemic, and the tarsal conjunctiva showed papillary hypertrophy. A viscid mucous secretion accumulated at the lower fornix; it contained conjunctival and corneal epithelia and xerosis bacilli. There was pericorneal injection, and on both corneas below the center were old facets. With the cessation of tears the previously normal menstruation became more scanty and was associated with headache, weakness, and pain in the lower extremities. Etiologically an endocrine disturbance seemed probable, and it is significant that no further pregnancies occurred after the onset of the affection. *C. Zimmermann.*

Michail, D. **Congenital angioneurotic edema with germinal dysplasia, masked hyperthyroidism, and lid edema.** Zeit. f. Augenh., 1931, v. 73, March, p. 337.

A youth of twenty-one years with childlike habitus was afflicted with an inflammatory swelling of the left half of the face. Attacks became progressively worse, being particularly bad in spring. Finally the attacks led to ptosis of the left upper lid, hypertrophy of the lower lid, hyperpigmentation of the skin of the lids and of the hair, and chemosis. There were associated stigmata of embryonic dysplasia, increased basal metabolism, increased vagotonia, and extreme local irritability of the tissues. At the time of a palpebroconjunctival biopsy there was extreme and prolonged tissue reaction. Histologically the process was found to be a

chronic proliferative exudative inflammation with partial epithelial atrophy. A great variety of names have been suggested for this affection. Many clinical phases and etiological factors have been studied, but there is always an angioneurotic element. The author suggests that the affection be called palpebral angioneurotic edema.

F. H. Haessler.

Monthus, A., Favory, A., and Levaditi, Jean. **Concerning a case of rat-bite fever from a bite of the eyelid.** Arch. d'Opht., 1931, v. 48, July, p. 493.

A one-year-old child was bitten by a rat in the region of the left upper lid. Eight days later there was marked swelling of the lid, with tenderness. The temperature was 37.5°C. Incision yielded only serous discharge, and cultures were negative. After fifteen days a Wassermann test was partially positive and a Hecht strongly positive. Arsenicals were given, with reduction of temperature and disappearance of the local inflammation. Digestive complications ensued, with death of the infant about nine weeks after the bite. A diagnosis of rat-bite fever was made although the organism was not recovered. *M. F. Weymann.*

Weingott, L. **Plastic operation for cicatrical ectropion of the lids.** Arch. d'Opht., 1931, v. 48, July, p. 505.

This is the application of the inverted Y-V principle to a case of ectropion due to a burn of the face. The operation may be easily visualized by referring to the diagram which accompanies the article. *M. F. Weymann.*

15. TUMORS

Bistis, J. **A case of myxoma of the orbit.** Arch. d'Opht., 1931, v. 48, June, p. 440.

In a twenty-year-old man, an orbital tumor of slow growth over a period of three years was removed by a brow incision. The tumor was 1 by 2 cm., soft, lobulated, and circumscribed. Histological examination showed it to be a pure myxoma. Origin was considered to be in an embryological rest in the loose connective tissue of the orbit.

M. F. Weymann.

Colley, Thomas. **Tumors of the lacrimal gland.** Brit. Jour. Ophth., 1931, v. 15, June, p. 305.

In 1901 Warthin collected 132 cases. In 1922 Lane added 112 cases and the author has found 17 cases reported in the literature during the past eight years. The author's present case illustrates the possibility of recovery of useful vision when the optic nerve has been subjected to severe stretching.

A female aged thirty-seven years had noticed, two years previous to coming under observation, a small lump under the outer part of the right eyebrow. The lump gradually increased, causing diplopia and displacing the eyeball over the inferior margin of the orbit. The visual axis was directed 19 mm. downward and 8 mm. inward. The upper lid moved freely over the growth. Vision equalled light perception. The growth, which was freely movable and extended 35 mm. toward the apex, was easily removed, the only attachment being to the conjunctiva of the fornix. Final results were very satisfactory, although there remained a slight ptosis. Vision, with correction, —1.00 —2.00 axis 105° equalled 6/5 partly. The tumor was encapsulated and measured 35 mm. in its longest diameter. Microscopic sections showed the growth to be a spindle-celled sarcoma. There has been no recurrence in four years. (Four illustrations and eighteen references.)

D. F. Harbridge.

Daniels, B. **Sympathetic ophthalmia after choroidal sarcoma.** Zeit. f. Augenh., 1931, v. 74, May, p. 146. (See Section 7, Uveal tract, sympathetic disease, and aqueous humor.)

Ehlers, H. and Okkels, H. **Mixed tumor of the lacrimal gland.** Acta Ophth., 1931, v. 9, p. 68.

The reported tumor is from a woman forty-two years of age; it could not be completely removed by an incision through the eyebrow; at the second operation (Krönlein) it was completely

removed with the sacrifice of a portion of the levator of the lid. Nine microphotographs of the growth illustrate its histogenesis. The authors believe with Masson that the growth is formed through metaplasia of two tissues, glandular and fibrous; the microphotographs show gradual myxomatous transformation of the epithelial elements. Clinically there are two types of this growth; a slow benign circumscribed type, without tendency to recur, and a rapid semimalignant form, which breaks through the capsule, and requires sacrifice of surrounding tissues to avoid recurrence. There is in addition a rare cancerous type. Positive diagnosis is practically impossible, but a probable diagnosis may be based on the following symptoms: advanced age of the patient, slow development of a firm growth in the superolateral angle of the orbit, displacement of the globe downward, lack of diplopia, early ptosis, neuralgic pains, astigmatism due to pressure, eventual hypertension, and absence of involvement of the optic nerve. The tumors should be treated as malignant, and removed thoroughly, preferably by the Krönlein method.

Ray K. Daily.

Fuchs, A. **On the influence of tumors on neighboring vessels, and its clinical significance.** Klin. M. f. Augenh., 1931, v. 86, June, p. 721.

Fuchs describes five cases of glioma of the retina with a great abundance of vessels in the optic nerve, chiefly most likely very small veins, which became ectatic. In the first case the tumor had not invaded the optic nerve. The enormous ectasia of the vessels cannot be explained by stasis. Fuchs attributes the distant influence of some tumors and perhaps other processes on the vessels to a kind of stimulation of growth. In sarcoma of the ciliary body he proved anatomically the pathological changes of the corresponding episcleral vessels. *C. Zimmermann.*

Lindberg, J. G. **Three cases of glioma of the optic nerve.** Acta Ophth., 1931, v. 9, p. 200.

Gliomas constitute the majority of the 222 reported primary growths of the optic nerve. They are quite unlike the malignant glioma of the retina, occur in early youth, probably originate from a congenital anlage, and have a very bizarre microscopic structure. The diagnosis can be made on a gradually increasing exophthalmos, retained mobility of the eyeball, and proptosis of the eye directly forward. The author's three patients were 7, 14, and 61 years of age respectively. The first patient was well two years after removal of the growth. The second patient died of postoperative meningitis, and at autopsy the growth was found to extend beyond the chiasm. The third patient was well six months after the growth had been removed. The article is illustrated with photographs of the patients and of the tumors.

Ray K. Daily.

Margotta, G. **Melanosarcoma of the choroid in an atrophic bulbus with ossification.** (Plates.) Ann. di Ottal., 1931, v. 59, May, p. 416.

A man of seventy years had had acute conjunctivitis at the age of twenty-four years, followed by atrophy of the globe. A year earlier the eye had become painful, red, and the surrounding tissues swollen. On enucleation a thick fleshy mass was found on the posterior surface, involving all of the external structures. On sectioning the ball a neoplasm of the size of a pea was found over the almost destroyed scleral tissues and was shown to be a round-cell sarcoma, rapidly developed in an atrophic globe, with ossification probably arising from the choroid. (Bibliography.) *Park Lewis.*

Marin Amat, M. **Plexiform neuroma of the orbit, of the upper lid, and of the temporal region, of congenital origin.** Arch. d'Opht., 1931, v. 48, July, p. 509.

An infant of twenty-eight months had a swelling of the left upper lid which had increased gradually since birth. During the last ten days there had been suppuration. The skin was normal in color. The suppuration was

due to catarrhal conjunctivitis and corneal ulcer. The lid was much thickened and contained nodules the size of a hazelnut over which the skin was movable. They felt like knots in a piece of yarn. The tumor was not tender. The left orbit was enlarged. The tumor mass was removed by dissection. Microscopic examination showed it to be made up of cords of modified nerve tissue surrounded by connective tissue. The diagnosis was plexiform neuroma of the orbit. At the end of fifteen days the child was completely cured. (Photographs and photomicrographs.)

M. F. Weymann.

Mohr, Emil. **Glioma retinæ simulating tuberculous iritis.** Zeit. f. Augenh., 1931, April, v. 74, p. 35.

The eye of a five-year-old girl is described in which it was impossible to say clinically whether one was dealing with glioma retinæ or tuberculosis. Cytological study of the aqueous revealed only round cells. After a second puncture fluid was obtained with cell clumps which were characteristic of glioma. An interesting finding was early involvement of the iris, clinically demonstrable as transilluminable areas. As a point of differentiation Meissner has stated that nodular tuberculosis does not occur in the glioma eye. To contradict this the author quotes a case report by Kyrieleis. *F. H. Haessler.*

Patterson, N., and Cairns, H. **Observations on the treatment of orbital osteoma, with report of a case.** Brit. Jour. Ophth., 1931, v. 15, Aug., p. 458.

A female aged twenty-six years presented a hard growth in the region of the left internal canthus, probably of two or three years duration. There was reduced vision, enlarged blind spot, restricted field above, and eyeball displaced forward and outward. X-rays showed no intracranial projection.

The osteoma was successfully removed by the nasoorbital route. Small areas of erosion showed that the tumor had been in contact with the roof of the orbit but no involvement of the dura was evident.

Patterson contends that the nasoorbital route is best. X-ray study reveals important relationships and size of the tumor. More room for delivery can be obtained by removing portions of the nasal bone. There is no external deformity and very little scar noticeable. The danger of sinus suppuration is avoided.

Cairns favors the transfrontal approach, which consists in turning back on the temporal muscle an osteoplastic flap that corresponds to one side of the forehead. Thus the roof of the orbit is exposed, and if there is intracranial extension of the tumor with tears or holes in the dura these can be adequately dealt with. The incision is wholly within the hair line.

Each case of osteoma of the orbit must be considered separately after careful x-ray study. (Seven illustrations.) *D. F. Harbridge.*

Pearson, G. H. **A rapidly growing malignant tumor of the lacrimal gland.** Brit. Jour. Ophth., 1931, v. 16, June, p. 314.

A male Chinese aged twenty-one years presented a large projecting mass involving the entire upper lid of the right eye. The growth was of forty days' duration. The bulbar conjunctiva was edematous, the right preauricular glands markedly enlarged. Removal was planned but exploratory operation demonstrated the futility of such a procedure. Complete orbital evisceration was proposed but was declined. Microscopic sections showed malignancy, but on account of the specimen being of poor quality definite details could not be given. (Two illustrations.)

D. F. Harbridge.

Popovie, J. M. **Modification of puncture of the eyeball for diagnosis of sarcoma of the choroid.** Klin. M. f. Augenh., 1931, v. 86, June, p. 816.

Corresponding to the site of the tumor the conjunctiva is incised for 1 cm., dissected from the sclera, and the edges held apart with forceps or hooks. The sclera is punctured with the syringe, and after withdrawal of the

needle the opening is covered with bovine fascia (Merck), 1 cm. square, over which the conjunctiva is sewn with two sutures. Thus the sarcomatous needle does not touch the bulbar conjunctiva and filtration and dissemination of tumor cells (as histologically proved by Scheerer) are prevented, and the conjunctiva does not later come in contact with the puncture canal.

C. Zimmermann.

16. INJURIES

Ahlbom, H. **A new method of localization of ocular foreign bodies: distance roentgenography, and outlining of the cornea.** Acta Ophth., 1931, v. 9, p. 1.

The roentgenographic procedures used in localizing ocular foreign bodies are: (1) the ordinary method which consists of two exposures taken at right angles to each other, (2) the stereoscopic and stereometric method, (3) bone-free roentgenography of the anterior segment of the eyeball, (4) the so-called mathematical methods; (5) the physiologic method based on several exposures at different directions of the optic axis, (6) methods which outline the eyeball after injection of radioopaque substances around it. After discussing the deficiencies and pitfalls of each method, the author describes and illustrates his own method, for which he claims the following advantages: It combines the method of two exposures with the physiologic method, thus making it easier to determine whether the foreign body is intraocular or extraocular; it eliminates enlargement and distortion through the use of parallel rays, obtained with a focal distance of 2.75 meters; it has a device which permits perfect control of the patient's fixation; and it outlines the corneal profile by interposition of an aluminum wedge between the plate and the eyeball. This article is published in English in the Acta Radiologica.

Ray K. Daily.

Blegvad, O. **Ocular injuries due to radium.** Acta Ophth., 1931, v. 9, p. 32.

The author reports radium injuries observed in thirty-four patients treated for carcinoma of the lids. He calls particular attention to a type of injury not heretofore described, which consists in an overlapping of the cutaneous over the mucous lid margin, or vice versa. He explains this occurrence by a difference in the radium sensitivity of the epidermis and mucous membrane. The epidermis, being less sensitive, heals faster and extends over the slower healing mucous membrane. This occurred in ten cases, and caused a sensation of stinging, injection, secretion, prolonged corneal irritation, and in one case keratitis. In two cases the mucous membrane on the lower lid at the external canthus extended over the cutaneous lid margin. This caused no symptoms. Of the other complications, the author mentions several cases of conjunctivitis; dilated and tortuous scleral vessels in ten cases; corneal injuries in thirteen cases; one case of sector atrophy of the iris; and four cataracts, one of which was operated upon uneventfully. In three of the cataract cases the globe had not been protected, and in one the lead prothesis was 0.5 mm. in thickness. In cases in which the globe was protected by 3 mm. of lead the lens was not injured.

Ray K. Daily.

Corrado, M. **Histoclinical contribution to conjunctival inclusion cysts.** (Illustrations.) Ann. di Ottal., 1931, v. 59, May, p. 445.

Two cases are described: A harvester working in the field was struck in the eye by a blade of wheat. There was a little bleeding, very little redness, and almost no discomfort, and in a few days the eye was seemingly normal. A year later, on the site of the injury a small elevation was noticed that ten months later had reached the size of a large bean. It was carefully removed intact, fixed in formalin, and examined microscopically. From the histological examination it was deduced that the cyst was formed of bulbar and conjunctival epithelium, constituting an inclusion cyst of traumatic origin involving the bulbar conjunctiva near the limbus.

A small part of the conjunctiva had been carried to the corneal margin under the bulbar conjunctiva. The outer wound quickly healed. The transported segment adhering to the traumatized corneal margin grew after the manner of a false pterygium. The epithelial element buried under the conjunctiva slowly proliferated and formed a cyst. The second case was very similar though no direct injury could be traced. (Bibliography.) *Park Lewis.*

Hesse, Robert. **The question of Vossius' annular lens opacity.** Klin. M. f. Augenh., 1931, v. 87, July p. 55.

In 1918 Hesse maintained that Vossius' opacity was caused by deposit of corpuscular substances consisting of blood or blood elements on the anterior capsule of the lens. None of the later publications brought material which could change his opinion, but the nature of the accumulations can only be decided ultimately by histological examination. *C. Zimmermann.*

Larsson, S. **Further studies of consensual posttraumatic reduction of intraocular tension.** Acta Ophth., 1931, v. 9, p. 85.

The author refers to a former study. (Acta Ophthalmologica, v. 8) on the influence of ocular injuries on the tension of the fellow eye. It has been demonstrated experimentally that injection of small quantities of saline solution into the vitreous leads to prolonged reduction of intraocular tension, which not infrequently involves also the other eye. An accident during an operation for strabismus demonstrated that this process also takes place in the human eye. While anesthetizing the eye with an injection of novocain and adrenalin, the eyeball was inadvertently perforated and about 0.1 c.c. of the solution was injected into the vitreous. There was an immediate rise in tension, and the cornea became steamy. Within the next few days the injured eye showed some opacity of the aqueous, fine floating vitreous opacities, and prominence of the papilla with indistinct margins and dilated veins. The other eye also showed some opacity of the aqueous and dilatation of the veins in the fundus, and the tension in both eyes was markedly reduced. The uninjured eye returned to normal within one week after the injury, but the tension remained low for three weeks. It was seven weeks before the injured eye completely recovered. The course of this case confirms the experimental observation made on rabbits' eyes, that in injury of one eye the fellow eye shares in the reaction; the reaction of the uninjured eye manifesting itself in reduced intraocular tension.

Ray K. Daily.

Lueb, M. **Burn of the eye due to hot bouillon.** Zeit. f. Augenh, 1931, v. 74, May, p. 176.

Two cases are reported in which the eye was burned with hot bouillon. The burns were more severe than those caused by water, probably because of the higher boiling temperature and the fat content of the bouillon. In both cases healing proceeded very slowly. In one case it required three and in the other four months, but the cornea eventually became practically clear.

F. H. Haessler.

Pellathy, B. V. **A rare change in the eyeground following blunt injury to the eyeball.** Zeit. f. Augenh., 1931, v. 73, March, p. 376.

After a blunt injury a peculiar eyeground picture was seen, the genesis of several details of which is not clear. This lesion was circular, contiguous to the disc and not concentric with it or the macula. It consisted essentially of a large circular area of hemorrhage surrounded by two sharply defined white to pale-yellow rings. *F. H. Haessler.*

Strebel, J., **Injuries of the eyes by stings of bees and wasps.** Klin. M. f. Augenh., 1931, v. 86, May, p. 657.

Strebel reports the clinical histories of two cases of stings of the cornea by bees, with discussion of the nature of the sting and its poisons. The sting of a bee may heal in the cornea, without irritation, even if it projects into the an-

terior chamber. In such event there is no indication for its removal, just as with a lash in the anterior chamber. Eyes stung in the cornea, which may look like having panophthalmitis and appear to give an unfavorable prognosis, may be saved even when the sting cannot be removed, if secondary infection is prevented by touching the wound with hydrogen peroxide or liquor chlori, the organic poison, which at first lies superficially, being thus wiped off and neutralized. If the sting projects for a few millimeters into the anterior chamber, the aqueous must by repeated punctures be freed from the poison, the sting then extracted, and the wound touched with hydrogen peroxide. *C. Zimmermann.*

Süchting, Otto. **Abscess of vitreous caused by fungus infection.** Zeit. f. Augenh., 1931, v. 74, June, p. 243.

This is the report of a case of fungus infection of the interior of the eyeball. Three days after perforating injury which had brought on an attack of acute glaucoma, a small chip of iron was removed. Abscess of the vitreous followed, which necessitated enucleation. The fungus must have reached the bulb with the injury (the patient was a gardener). Since cultures were not made from the pus, the type of fungus was not determined, and the diagnosis rested on the microscopic findings. Three types of case have been reported in the literature: (1) due to perforating injury, as in the present case; (2) corneal ulcer spreading into the bulb; (3) without known portal of entry. *F. H. Haessler.*

Wibaut, F., and Wolff, L. K. **Treatment of traumatic cataract.** Klin. M. f. Augenh., 1931, v. 87, July, p. 49.

From theoretical consideration of swelling of the lens substance after injuries of the anterior capsule, a method is described for prevention of the swelling by injection of nitrogen into the anterior chamber. *C. Zimmermann.*

Wolff, J. **Traumatic diabetes insipidus from lesion of the region of the hypophysis.** (Eye injury.) Klin. M. f. Augenh., 1931, v. 86, June, p. 799, (ill.).

The left eye of a man aged thirty-seven years was injured by a piece of wood which projected for 2 cm. between the closed edematous swollen lids and was immovable. In narcosis a billiard cone 13 cm. long and 1.5 cm. in diameter was extracted with great effort, followed by profuse hemorrhage from orbit and mouth, so that some vessels had to be clamped. The left eyeball deviated to the temporal side and was not injured externally. There was total ptosis and immobility of the right, uninjured eye, and after a fortnight diabetes insipidus set in. In the further course both optic nerves became atrophic, with total amaurosis. Apparently the foreign body entered the nasopharynx along the left nasoorbital wall, with destruction of the ethmoidal cells, severance of the left optic nerve, and fracture of the sella. The right optic nerve must have been injured by splinters of bone, which also destroyed the third, fourth, and sixth nerves, and perhaps the sympathetic, as evidenced by the miosis. The fracture of the sella led to a lesion of the hyophysis-midbrain system and thus to diabetes insipidus, which, however, finally subsided. *C. Zimmermann.*

17. SYSTEMIC DISEASES AND PARASITES

Connelly, J. J. **Mouth conditions causing ocular infections.** Indiana State Med. Jour., 1931, v. 24, April, p. 190.

In this paper a discussion of the usual foci of infection is given and special stress is laid upon the teeth and gums as the most frequent source of focal infection. Pyorrhea, septic broken roots, infection of jaw after extraction of diseased teeth, pulp stones, and degenerating pulp are given in addition to apical abscesses as mouth conditions causing eye infection. These may look trivial but still be responsible for severe infections. The diagnosis should be made chiefly from the x-ray findings. (Three case reports and discussion.)
M. E. Marcove.

Doggart, J. H. **The ocular complications of acne rosacea.** Brit. Jour. Ophth., 1931, v. 15, Aug., p. 446.

Women are more frequently affected, and ages thirty to sixty years. Tea, alcohol, and dysmenorrhea are suspected causes; gastric hydrochloric acid is below normal.

Ocular complications are blepharitis, chalazion, conjunctivitis, episcleral nodules, keratitis, and iritis. The latter usually follows corneal involvement. There is no specific treatment, ultraviolet light and x-ray afford some success.

The author investigated clinically seventy-eight cases of acne rosacea, sixty-one of which suffered from ocular complications. In two cases the cornea was attacked in spite of very mild facial manifestations. The first signs of facial disturbance usually preceded the eye trouble by a considerable interval—as long as ten years. Conjunctivitis was a prominent feature. Thirty-eight patients had corneal lesions, the first indication being encroachment upon the cornea by loops of conjunctival vessels. Eleven examples of chalazion were observed. Some degree of scaly blepharitis was observed in all. (Eight illustrative cases: bibliography.) *D. F. Harbridge.*

Jahnke, W., and Wamoscher, L. **On serum therapy in pneumococcus disease of the eye.** Zeit. f. Augenh., 1931, v. 74, June, p. 214.

The authors review briefly what is known about types of pneumococci and their characteristics. Their work was done with pure cultures of pneumococci tested for bile solubility, mouse virulence, and agglutination with sera obtained from the New York Department of Health. The material came from patients suffering from conjunctivitis, tear sac abscess, serpent ulcer, and normal corneas examined for bacterial flora before operations on the eyeball. One hundred and four cultures were examined, of which only seventy-three proved to be true pneumococcus. Type one was found only once. On a normal conjunctiva type two was found nine times, type three twelve times, and type four fifty-one times. The prognosis of serpent ulcer, which in each instance was caused by pneumococcus, is not dependent on the type of pneumococcus found. In the authors' series the two cases of type two healed without perforation, but the one case of type three was not seen until after perforation had occurred. Of the cases caused by type four two healed after perforation of the cornea, whereas the other three led to loss of the eye. The authors conclude that at the present time serum therapy in pneumococcus disease of the eye is useless.

F. H. Haessler.

Lech, J. **Some unusually good photographs of cysticercus in the vitreous.** Klin. M. f. Augenh., 1931, v. 87, July, p. 105. (ill.).

The left eye of a man aged forty-two years showed opacities of the vitreous caused by a cysticercus firmly attached to the wall of the globe. After an unsuccessful attempt at extraction the cysticercus came entirely into the vitreous, so that it was possible to make eight photographs of it. The vesicle was 2.5 disc diameters across and contained a scolex 1.5 disc diameters long, which someimes projected inward, sometimes entirely outward. Successful extraction was followed by cyclitis, with dense opacity of the vitreous which destroyed the sight.

C. Zimmermann.

Meisner, W. **The place of ocular tuberculosis in the general tuberculosis problem.** Zeit. f. Augenh., 1931, v. 74, May, p. 129.

When the tubercle bacillus enters the uninfected body it produces a primary ulcerative inflammation with involvement of the regional lymph nodes. The whole is called the primary complex; it is usually situated in the lung, less frequently the gut. Rarely the conjunctiva may be the seat of the primary complex. The local prognosis is good. The commoner form of conjunctival tuberculosis is bilateral without lymphoid involvement.

The overwhelming majority of cases of eye tuberculosis are secondary, although frequently the primary lesion is not demonstrated. Only Werdenberg with a clinic schooled in tuberculosis study reports finding the primary lesion for 78 of 110 tuberculous eyes. The bronchial nodes are most frequently found to be the place from which the ocular lesion has been disseminated. Usually dissemination is hematogenous; usually a node breaks through a vein, occasionally tubercle bacilli are fed into the blood through the lymph. Occasionally a miliary tuberculosis of the lung is roentgenographically demonstrable coincidentally with an ocular tuberculosis of hematogenous dissemination. The general infection is frequently missed by the patient or interpreted as grippe.

It is well known that ocular tuberculosis is rarely seen in patients with severe pulmonary tuberculosis. The author suggests that this finding supports the current theory on the pathogenesis of progressive pulmonary tuberculosis, namely, that it is an exogenous infection in persons who are not kept immune by occasional periods of tuberculous bacillemia from an old glandular focus. In Vienna tubercle bacilli have recently been demonstrated in the blood stream during the course of an ocular tuberculosis.

Several clinical types are briefly outlined. Recurrent vitreous hemorrhage of youth occurs in the third decennium and may heal with good vision or end in retinal detachment or glaucoma. Axenfeld saw lesions on the vein which he believed to be tubercles. Later Fleischer was able to demonstrate anatomically that these structures were part of a tuberculous periphlebitis. Solitary tubercle, usually of the uvea, occurs characteristically in early life, before immunity has developed. The sclera is gradually destroyed and the eye must be removed. Neither nonspecific nor specific therapy influences the course. The disease is always unilateral and the prognosis quoad vitam is good. Solitary tubercle also occurs in adults, but usually after the general allergy against tubercle is reduced by some disabling condition. There are rarer forms which also depend on decreased allergy—tuberculous panophthalmitis and the retinal lesion characterized by the presence of many bacilli in the retina with very little inflammatory reaction, which Stock calls metastatic tuberculous ophthalmia, and also the conglomerate tubercle in the choroid which may simulate neoplasm. Miliary tubercle of the choroid also belongs in this category. It is in reality a hematogenous metastasis, as is iritis with miliary tubercles and disseminated choroiditis, but because of the low state of allergy has a very poor prognosis quoad vitam. Similar large tubercles may occur in the conjunctiva and sclera. The prognosis is then not different from that of uveal lesions.

Cases of scrofulous keratoconjunctivitis Meisner considers without exception to be tuberculous in a state of allergy. He bases this opinion on the almost consistently positive tuberculin reaction, the almost constantly demonstrable pulmonary tuberculosis, the response to tuberculin therapy, and the similarity to the conjunctival reaction in the Calmette test. All other forms of ocular tuberculosis belong to the stage which Ranke calls tertiary. The general immunity prevents stormy inflammation and tissue destruction.

Before starting specific therapy a most careful general examination is necessary. Meisner does not use diagnostic injection. The Pirquet test is safe. He starts with very small doses, prefers albumose-free old tuberculin, though he also approves of bacillary emulsion and Beranek's tuberculin. Tebeprotein was disappointing. He increases doses very slowly, never by more than one half, and gives two injections per week.

Roentgenotherapy must be as carefully and individually regulated as to dosage as must tuberculin. It is useful in productive forms of uveitis. Fibrinous forms react less noticeably. Greatest caution is urged in exudative allergic subjects. The most important factor in successful therapy is the exact

diagnosis of type of ocular lesion and of general bodily state.

F. H. Haessler.

Szily, A. **On migratory tubercles. A contribution on the spread of intraocular tuberculosis.** Klin. M. f. Augenh., 1931, v. 87, July, p. 13 (ill.).

Tuberculous infection of the eye generally occurs from the blood and is an endogenous metastasis. Szily considers here the possibility of the conveyance of bacilli or material containing bacilli from primary foci in the walls of the eye into the intraocular cavities and their deposit and further development at places far distant from the original. He describes the histological conditions of three eyeballs of young persons affected with severe intraocular tuberculosis. They showed lardaceous deposits on Descemet's membrane and the anterior capsule of the lens, presented the structure of tubercles with giant cells, and are called by the author migratory tubercles. The most important source for this tuberculous tissue material undoubtedly is the ciliary body. The pictures here reproduced are also of interest for the general pathologist, as in them all early stages of the individual tubercle can be studied as in a tissue culture. Szily thinks that the conditions here described, of local spreading of intraocular tuberculosis by continuity, ought to be given greater attention.

C. Zimmermann.

Thies, Oskar. **Ocular disturbances in females from changes in the internal secretions.** Graefe's Arch., 1930, v. 124, p. 731.

The author reported finding only during menstruation a marginal keratitis in a case of dysmenorrhea and a similar condition in a case of genital hypoplasia, recurring marginal phlyctenules with transient amblyopia in two cases with dysmenorrhea and genital hyoplasia, dystrophy of the central part of the cornea in one case and central choroiditis of the right eye in another case at the menopause associated with hypogenitalism. After treatment with hormone from the anterior lobe of the hypophysis or that from the placenta of bearing cattle the ocular changes disappeared and the genital condition improved.

In a second series of five cases with changes in the thyroid associated with genital hypoplasia, there was observed a marginal keratitis at the menstrual periods associated with dysmenorrhea in a case of goiter; in two other cases with goiter and dysmenorrhea an amblyopia just before the menses; in another case with Basedow's disease and exophthalmos a marginal keratitis just prior to the menstrual periods; and in the fifth patient, fifty-eight years old, after many years of periodic recurrences of disturbed vision, there were noted thousands of tiny precipitates on Descemet's membrane with increase of tension. The ocular changes did not recur after treatment with anterior lobe of the hypophysis and placental extracts and the general subjective symptoms improved.

A group of five cases were affected with fat dystrophy or simple adiposity associated with genital hypoplasia; all but one case suffered with dysmenorrhea. In one case there occurred at the menses an amblyopia to 0.5 or 0.6 of normal vision with the visual fields contracted to the same extent in each eye. In another case there were old and recent foci of disseminated choroiditis in both eyes, with broad firm posterior synechiæ in the left eye. In two cases beyond the menopause there had been, before and since the climacteric, recurrent attacks of iritis. In the fifth case bilateral incipient optic neuritis with vision of 0.8 was observed. The ocular changes as well as the general condition were rapidly improved by the use of anterior lobe of hypophysis and placental hormones.

Two cases were observed with disturbances of the hypophysis associated with genital hypoplasia; in one case, at the menstrual periods, there were recurrent attacks of marginal phlyctenules in both eyes, and in the other case there was in each eye an intensive papillitis with vision of 0.7. Treatment

with hormones was completely effectual for the ocular symptoms.

The last case, one of myxedema, showed an intense optic neuritis in each eye: because of the pronounced anemia, liver therapy was first used and later thyroidin; after two and one-half months treatment vision had returned to normal in each eye and the general condition was pretty well restored to normal. *H. D. Lamb.*

18. HYGIENE, SOCIOLOGY, EDUCATION, AND HISTORY

Caesar. **Trachoma, with special reference to experience in Dortmund.** Zeit. f. Augenh., 1931, April, v. 74, p. 43.

In Dortmund there are two trachomatous per ten thousand of the population. This may be due to the fact that a great effort is made to find all infected persons. The unknown afflicted persons are the greatest danger to the community. Routine examination of all school children is possible and very useful. To extend this survey to other groups—factories, mines, and so on, seems possible and desirable. Of 112 cases found in schools during the survey, only thirty-three cases would have been discovered without this means through the attending physician.

F. H. Haessler.

Villard. H. **The practice and teaching of ophthalmology in the Latin European countries (Belgium, Spain, France, Italy, Portugal, and Roumania).** Arch. d'Opht., 1931, v. 48, Feb., p. 125.

This is the report of an investigation undertaken at the request of the last International Congress of Ophthalmology. Much of the information given in this article is mentioned in an editorial in the July issue of the American Journal of Ophthalmology, page 689.

In Belgium there is no organized postgraduate work in ophthalmology. In Spain a two-year course of instruction exists for those who wish to receive the title of ophthalmologist.

In France there is no obligatory course for the practice of ophthalmology, but certain faculties of medicine present two types of course every year, one designed for the complete training of ophthalmologists, and the other to assist ophthalmologists already in practice who wish to pursue some special line of work. However, the majority of French ophthalmologists obtain their training in the hospitals restricted to treatment of eye diseases and spend several years in such training.

In Italy, in order to obtain the diploma of ophthalmologist, a three-year course must be followed in one of the Italian universities. At the present time there is no regular course in ophthalmology in Portugal, although from 1912 to 1929 there was an organized course at Lisbon. In Roumania the postgraduate teaching is also not organized, but, since a new law requires a degree in ophthalmology, a two-year course will be given in the three ophthalmological clinics of the universities at Bucharest, Cluj, and Jassy.

M. F. Weymann.

NEWS ITEMS

News Items in this issue were received from Dr. G. Oram Ring of Philadelphia, and Dr. William H. Crisp of Denver. News items should reach **Dr. Melville Black, 424 Metropolitan building, Denver,** by the twelfth of the month.

Deaths

Dr. Edward Fayette Cary, New York, aged fifty-five years, died August fourteenth, of agranulocytic angina.

Dr. Charles Hopkins Long, Chicago, aged sixty-seven years, died August nineteenth, of injuries received in an automobile accident.

Miscellaneous

The National Society for the Prevention of Blindness is now publishing "The Sight Saving Review," a journal of about eighty pages. The subscription price is three dollars a year and the journal is issued quarterly at 450 Seventh avenue, New York City. Lewis H. Carris is the editor and Isobel Janowich, managing editor.

At a meeting of the St. Louis Medical Society on October 20, under the auspices of the St. Louis Society for the Blind the winners of the Robert Johnston prizes for the best theses on "The Methods for Prevention of Ophthalmia Neonatorum and Their Practical Value" were announced. The contest commemorated the fiftieth anniversary of the use of the Credé method for the prevention of the disease. Dr. John O. McReynolds, of Dallas, Texas, president of the Texas Medical Association, was the honor guest and principal speaker of the evening. He was entertained at a dinner before the meeting by the Ophthalmic Section of the St. Louis Medical Society.

At the close of the 2nd International Hospital Congress which met in Vienna from June eighth to fourteenth, the representatives of the 41 countries participating in the Congress voted unanimously to organize an International Hospital Association.

The purpose of the Association is to bring about an international exchange of opinion and international cooperation in all problems and in all fields of hospital work and in all relationships, economic, sociological and hygienic. The Association is composed of two classes of members: ordinary members consisting of national hospital associations and associate members.

These comprise two groups of persons interested directly or indirectly in hospitals, one consists of individuals associated, in one way or other in hospitals or cognate institutions, the other will be representatives of firms or organizations standing in a business relationship to the hospitals such as architects, builders, manufacturers of hospital supplies, merchants and the like.

The associate membership in the International Hospital Association entitles the members not only to free subscription to the "Nosokomeion," the official organ of the Association, to full participation in the International Hospital Congresses but above all to participation in the work of the 10 permanent committees. These committees under the leadership of recognized specialists in various fields will devote their time to working out standards for the guidance of the hospital field throughout the world.

The annual subscription for associate members of the first description is $5, and for the second, $10.

Those signing the notice appeal to all those interested in the proper care of the sick to become associate members. Applications may be sent directly to the officers of the Association or to any member of the Executive Committee.

Dr. René Sand is president and Dr. E. H. L. Corwin, 2 E. 103rd street, New York, secretary.

The Wills Hospital of Philadelphia has sold the site which it has occupied for one hundred years, at which time it was created, and has obtained a splendid location not far away from the present building, on which it will erect an eight-story structure with ample accommodations for out-patients and with two hundred beds.

For the first time in its history the Hospital will care for private room cases.

A well organized department of associated clinics, conducted by specialists in diseases of the nervous system, nose, throat, teeth, as well as those demanding the attention of internists, will enable the hospital to carry on all phases of its work within its own walls.

Twenty-five thousand out-patients are now cared for annually.

The new building will be ready for occupancy in the autumn of 1932.

Communications of the international ophthalmological council

1. The 14th International Ophthalmological Congress will take place in Madrid at the beginning of April, 1933. The principal subjects to be discussed at this congress, are:

(a) Tuberculosis of Iris and Corpus Ciliare —to be reported as follows: Dr. E. V. L. Brown, University of Chicago, 950 E. 59th street, Chicago, Ill. (U.S.A.), on "Modern methods of treatment"; Prof. Dr. J. Igersheimer, Brentanostrasse 1, Frankfort a. Main, Germany, "Pathological anatomy"; Dr. Henri Lagrange, 5 avenue Daniël, Lesueur, Paris, VII, France, "Diagnosis and differencial diagnosis."

(b) Detachment of the retina. This subject will be reported by: Dr. H. Arruga, Aragón 271, Barcelone, Spain, on "Aetiology"; Prof. Dr. G. Ovio, Viale Castro Pretorio 66, Rome, Italy, on "Medical treatment"; Prof. Dr. A. Vogt, Rämistrasse 73, Zürich, Switzerland, on "Operative treatment."

Authors of papers connected in any way with one of these two subjects are kindly re-

quested to send these papers to the reporters in question.

II. All communications to the congress shall essentially refer to the above named two subjects. There will, however, be reserved two or three meetings for free communications, including one demonstration meeting.

The number of lectures shall be limited, both with regard to those that correspond with the principal subjects as with regard to free communications. For this reason papers will have to be in the hands of the secretary of the International Ophthalmological Council on **December 1, 1932, at the latest.**

In order to secure the best selection from all papers sent in, an international committee of ophthalmologists shall previously test all communications. After that authors of communications shall be informed if their paper may be read or not.

III. With regard to reports drawn up for the 13th International Ophthalmological Congress on request of The International Ophthalmological Council, the complete commission of reporters shall take decisions during the 14th Congress. These decisions shall be communicated to the ophthalmologists individually, to ophthalmological societies and, if necessary, to the governments with a view to practical application.

Hence all ophthalmologists who hitherto failed to make any observations on the conclusions of the above named reports (to be found in the Proceedings of the 13th Congress, Vol. IV) are earnestly requested to address any observations or comments they should wish to make before May 1, 1932, to the secretary of The International Ophthalmologic Council.

IV. The reporter on the subject "Pathological anatomy of tubercular iridocyclitis," Prof. Dr. J. Igersheimer, requests all those who possess special preparations or slides on cases of tubercular iridocyclitis, to forward these to his address for perusal.

V. Oculists who wish to develop their professional knowledge abroad, either by a short visit to a foreign clinic, or in the way of a longer stay as a volunteer, may apply to the secretary of the International Ophthalmologic Council, who will try to find the situation that will suit them.

VI. In the year 1929, during the 13th International Ophthalmological Congress at Scheveningen, the International Ophthalmologic Council decided to start an Ophthalmological Library. Most of the ophthalmological periodicals have already been collected there. The library is established in Leiden. The object is to collect there everything that will be edited in the domain of ophthalmology. Our colleagues are therefore kindly requested to send a reprint or copy of their publications (viz., reviews in periodicals, books, theses, etc.) to the librarian of the International Ophthalmological Library, Dr. J. Kroon, Stationsweg 25, Leiden (Holland). Further particulars on the working method of this Library will follow in due course.

On behalf of the International Ophthalmological Council,

Signed E. Marx, Secretary.
Inrichting voor Ooglyders
Oostmolenwerf 5
Rotterdam, Holland

Personals

Dr. C. E. G. Shannon of Philadelphia has resumed his work at Jefferson Medical College after a summer sojourn at North Belgrade, Maine.

Dr. Martha Lyon of South Bend, Indiana, announces the removal of her office from the South Bend Clinic to the Building and Loan Tower of that city.

The private practice of the late Dr. L. Webster Fox has been taken over by Dr. William J. Harrison, of Philadelphia, at the former office of Dr. Fox.

Dr. Edward Jackson, Denver, was an invited guest lecturer at the annual fall clinical conference of the Oklahoma City Clinical Society on November second to fourth.

Dr. Howard Forde Hansall of Philadelphia has returned from a sojourn of three months on the continent, having divided the time about equally between Paris and Vittel.

The many friends of Dr. Wm. H. Wilder, of Chicago, learned with great distress of the drowning, on September twenty-fifth, of his son Wm. H. Wilder, Jr. Mr. Wilder was on a fishing trip in Northern Ontario. He was twenty-two years of age and in the second year of his medical course.

Dr. Vilray P. Blair, St. Louis, gave "An illustrated lecture on blepharoplastic and ptosis operative procedures" before the Section on Ophthalmology of the College of Physicians of Philadelphia, Thursday evening, October fifteenth, at the College of Physicians Building, Philadelphia.

The Medical Society of the City and County of Denver gave a dinner in honor of Dr. Edward Jackson, of Denver, on the evening of October sixth. A number of his friends and admirers presented to the trustees of the Society an oil portrait of Dr. Jackson. This portrait will be hung in the Society Library.

Societies

The regular meeting of the Kansas City Society of Ophthalmology and Oto-Laryngology was held October 8, 1931, in conjunction with the Kansas City Southwest Clinical Society. Dr. Arthur Bedell, Albany, New York, gave a diagnostic clinic and demonstrated the technique of fundus photography.

Dr. Edward H. Cary, president-elect of the American Medical Association, also gave a diagnostic clinic, particularly on glaucoma.

In the afternoon Dr. Bedell gave a talk on "Sudden blindness," with actual photographs of the fundus of the cases reported.

Dr. Cary read a paper on "Glaucoma and its importance and some of its contributing causes."